

# ROADS *and* STREETS

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

McGraw-Hill Publishing Co., 32 West Maple St.  
Chicago 10, Illinois Form 3547 Requested.

FEBRUARY 1955

## Engineering Bottleneck?

(ARBA Review See Page 48)

Income Tax Planning  
for Contractors

See Page 4 for Contents

Acceptance Authorized Under Sec. 34.64 P. L. & R.

**CARBIDE  
INSERT?  
or  
MULTI-USE?**

## 14 out of 17 contractors on new West Virginia turnpike cut drilling costs with TIMKEN® multi-use bits

SEVENTEEN contractors equipped with 189 wagon drills did the drilling on the new West Virginia turnpike and 14 of them used Timken® multi-use bits. Some tried other makes and then switched to Timken bits.

These 14 contractors found that, all things considered, Timken multi-use bits gave them lowest cost per foot of hole drilled. In the first place, the large range of Timken bit types and sizes enabled them to select the best bit for each job. Good bit reconditioning service was on hand and the contractors were able to secure a number of bit uses.

If you're drilling ordinary ground, Timken multi-use bits are most economical. However, for extremely hard and abrasive ground, Timken carbide insert bits drill faster and more economically. They're also best for drilling constant-diameter holes, small diameter blast holes, extremely deep holes. Some of the turnpike contractors used Timken carbide insert bits when they encountered exceptionally abrasive ground.

All Timken bits are interchangeable in the same thread series and a wide range of different bits fit the same steel. You can change bits right on the job. All Timken bits are made from Timken fine alloy steel and have special shoulder unions to protect the threads from drilling impacts.

Get the bits best fitted to your drilling needs. Call the Timken Rock Bit Engineering Service. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

LOCATION: West Virginia Turnpike.

OPERATING CONDITIONS: Varying.

your best bet  
for the best bit  
... for every job

# TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.



Timken  
multi-use rock bit



Timken  
carbide insert rock bit



P&H Truck Cranes — two of many that gave a cost-cutting assist on the New York Thruway.

## Better ideas are cutting costs



P&H 255-ATC, and a 655-B hoe team up in New Jersey.



P&H 255-A dragline cuts clean-up costs in Georgia.

## P&H shows how on road jobs... everywhere

Looking for the newest ways to cut costs on highway jobs? Look at P&H — for here's the big selection that lets you pick *exactly* the right machine for any job. P&H Truck Cranes range from 7- to 35-ton capacity... crawler machines up to 3½ yds.

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hydraulic control for faster, more responsive load handling. No wonder P&H can deliver more, every day of the week.

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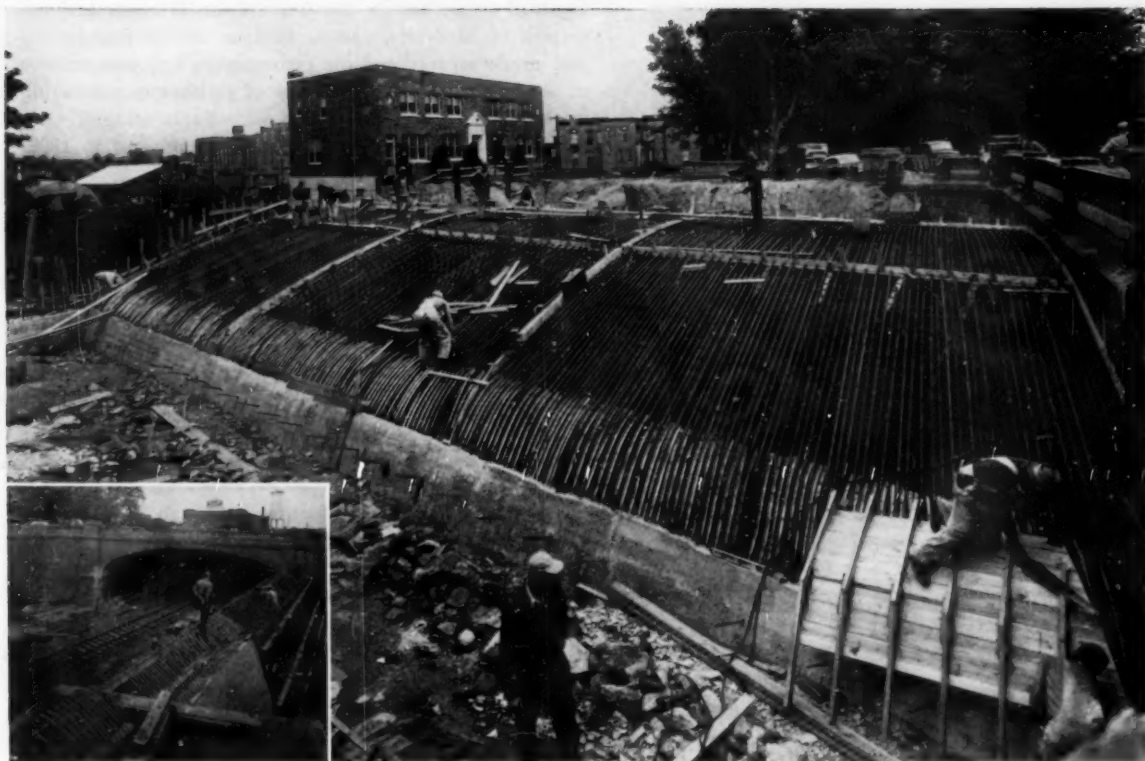
WELDING EQUIPMENT



OVERHEAD CRANES

... for more details circle 186, page 12





Bethlehem reinforcing bars in place on the new section of Philadelphia's Roosevelt Boulevard bridge at Second St. The bridge was widened to accommodate twelve lanes of traffic. General Contractor: Francis A. Canuso and Sons, Philadelphia. Steel was installed by L and R Construction Co., Haddon Heights, N. J.

## Bridge-Widening Eases Traffic Snarls on Busy Philadelphia Boulevard

Traffic on Philadelphia's Roosevelt Boulevard used to get into rush-hour snarls at several bridges, where the Boulevard's twelve lanes of traffic converged on to the bridges' six lanes. Now, thanks to the widening of these bridges to twelve lanes, traffic will proceed at a better pace.

The bridge at Second St., shown here during construction, was widened on both sides, so that the finished structure will have two three-lane local traffic arteries and two three-lane expressways in the center, separated by an 80-ft cement island.

Bethlehem supplied 320 tons of fabricated reinforcing bars for the Sec-

ond St. bridge and a total of 2100 tons of bars for all six bridges. The bars were specially bent and formed for the job at our Philadelphia bar fabricating shop.

Bethlehem has had years of experience in furnishing reinforcing steel to contractors. Bethlehem bars, made from new-billet steel to ASTM Specification A-305, are shipped completely fabricated from whichever of our eleven bar fabricating shops is nearest your job site.

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# Bethlehem

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# ROADS AND STREETS

Sixty-Three Years of Editorial Leadership

FEBRUARY, 1955

VOL. 98

NO. 2

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### GILLETTE PUBLISHING COMPANY

Publication and Editorial Offices: 22 West Maple Street, Chicago 10, Ill.

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**GOODYEAR  
WAS THERE!**

**6.1 MILE SHORT CUT**

**SETS EARTH-MOVING RECORDS!**

IN THE HEART OF THE GREAT SMOKIES, between Black Mountain and Old Fort, two new 22-foot pavements with 4-foot center strip and 10-foot shoulders, have at last replaced a dangerous bottleneck.

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## **3-T NYLON**

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Goodyear, Truck Tire Dept., Akron 16, Ohio

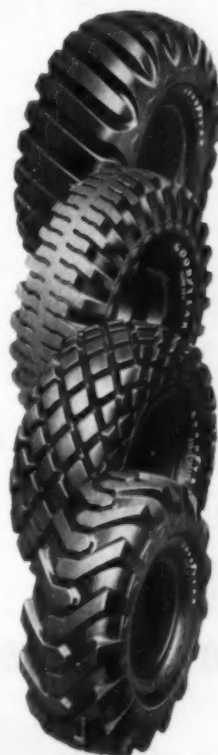
*FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE!*

# **GOODYEAR**

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

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**ROAD LUG**

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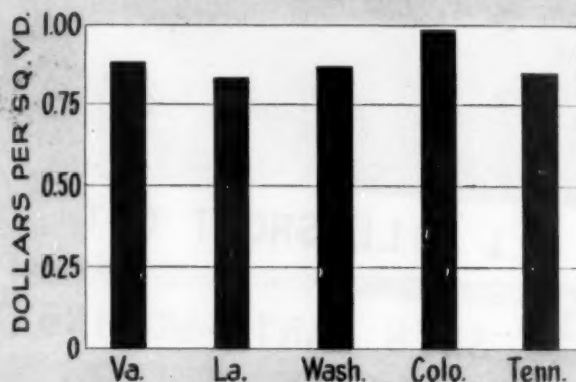


# Soil Cement Is Low Cost for Road Base Course

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Base materials native to the job can be used in many states. Even with imported materials, soil cement base course costs are lower in the long run. In the last 13 years soil cement paving awards increased from 9 million to 140 million square yards... that's a 1,555% increase!

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## TAKES HUGE LOAD!

These various combinations of surface materials placed over soil cement base course show the tremendous load bearing value. As in airport construction, load bearing value is an extremely important factor in long life for roads and streets. It will pay to investigate!

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BASE COURSE TYPE	BEARING VALUE K
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8" Compacted Gravel	355
6" Soil Cement	1012
5 1/2" Macadam + 2" Bituminous Surface	626
6" Soil Cement + 2" Bituminous Surface	475
Emul. Stab. + 2" Bituminous seal	240
6" Soil Cement	735
6" Sand-Clay + Bituminous seal	520
6" Soil Cement	940
8" Sand-Clay + Bituminous seal	520
6" Soil Cement + Bituminous seal	424
8" Bituminous Stab. + 2" Bituminous Surface	255

**Most Soil Cement  
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Subsidiary of PETTIBONE MULLIKEN CORP., Chicago, Illinois

... for more details circle 200, page 12

*200  
cubic yards  
an hour on a  
1500-foot  
haul*



Cat® DW20 Tractors and W20 Wagons are key units in the earthmoving spread of Geo. Bennett Construction Co., Kansas City, Kansas.

Loaded by the dragline, one of these machines handles 18 cubic yards of material and makes 11 to 12 quarter-mile round trips to the fill per hour. On a construction job near Turner, Kansas, three DW20-W20 units moved 25,584 yards of earth in five working days.

The Bennett Co. also has Caterpillar DW21s, D8s, D7s and Scrapers in its big yellow fleet. Mr. Bennett says: "I have been using Cat machines since 1920. They've been tough and rugged and have held up better than any competitive product I know of."

The fast-moving DW20 Tractor, with its 225-HP Caterpillar Engine, furnishes perfectly matched power for the W20 Wagon. The wagon itself is built to outperform and outlast any other hauling unit in its class. It's engi-

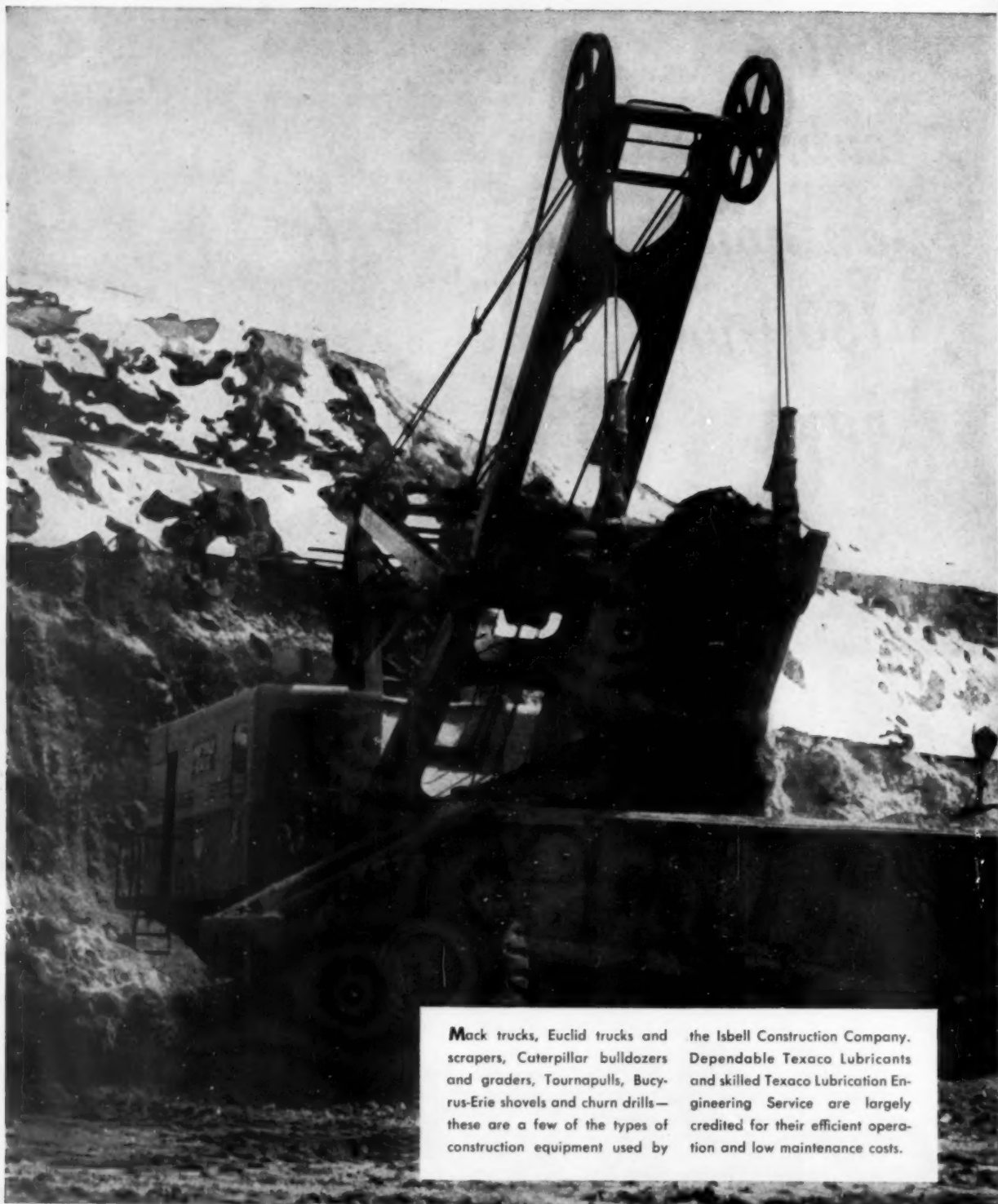
neered for the job, with weight evenly distributed between tractor and wagon tires. Hydraulic ram dumping gives the operator accurate control. And the generous size of the hopper offers a good target for the shovel.

Get actual production figures from your Caterpillar Dealer, nearby for information and service. He'll demonstrate right on your job, where you can compare cycle times with other equipment. Call him today.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

**CATERPILLAR®**

**NAME THE DATE...  
YOUR DEALER  
WILL DEMONSTRATE**



Mack trucks, Euclid trucks and scrapers, Caterpillar bulldozers and graders, Tournapulls, Bucyrus-Erie shovels and churn drills—these are a few of the types of construction equipment used by

the Isbell Construction Company. Dependable Texaco Lubricants and skilled Texaco Lubrication Engineering Service are largely credited for their efficient operation and low maintenance costs.

**TUNE IN ... TEXACO**  
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 starring JIMMY DURANTE  
 or DONALD O'CONNOR,  
 on TV Saturday nights.  
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 radio broadcasts  
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# TEXACO



# One of Nevada's biggest highway builders uses **TEXACO SIMPLIFIED LUBRICATION PLAN**

## **ISBELL CONSTRUCTION**

**COMPANY,** Reno, Nevada, not only is one of the state's biggest highway builders but does open-pit mining for some of Nevada's great copper mines. Operations on such a scale naturally call for millions of dollars' worth of equipment. To protect this huge investment, Isbell uses the Texaco Simplified Lubrication Plan because, the company says—

"With the Texaco Simplified Lubrication Plan we can handle all major lubrication with a minimum number of products. That keeps lubricant inventories low, reduces the chance of making lubrication mistakes, saves us time and expense on maintenance. And the smooth functioning of equipment is a big help in keeping our jobs on schedule."

### **Follow The Texaco Simplified Lubrication Plan**

Contractors throughout the country find this unique plan eliminates lubrication errors, saves time and money. All major lubrication can be done with *not more than six* Texaco Lubricants:

**1. Engines:** Diesel and heavy duty gasoline engines run better when lubricated with one of the famous *Texaco Ursa Oil* series—a complete line of lubricants especially refined to make engines give

*more power with less fuel over longer periods between overhauls.*

**2. Chassis:** Get longer lasting protection with *Texaco Marfak*, the lubricant that won't jar or squeeze out, that protects against dirt, rust and wear. *More than 555 million pounds of Texaco Marfak have been sold.*

**3. Wheel Bearings:** They last longer when lubricated with *Texaco Marfak Heavy Duty*. It seals out dirt and moisture, seals itself in—assures safer braking. No seasonal change required.

**4. Crawler Tracks:** Assure longer service by lubricating with *Texaco Track Roll Lubricant*, an effective guardian against dirt, water and wear.

**5. Air Compressors:** Clean and efficient operation is assured when you use the Texaco air compressor oil especially recommended for your particular operating condition.

**6. Rock Drills:** Get better protection against wear and rust with *Texaco Rock Drill Lubricant EP*.

Let a Texaco Lubrication Engineer help you simplify and improve your lubrication procedures. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

# Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

... for more details circle 209, page 12

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# GET ON THE ROAD TO HIGHER PROFITS WITH GALION DUO-SCOPIC HOISTS

haul more...earn more...with every load



Model 66381 outrigger mounted Duo-scopie hoist with Model 12N-5 body. Hoist capacity up to 22 tons.

Start earning extra profits  
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Galion Duo-scopie hoists, mounted on trucks with high-capacity front axles, offer a solution to the problem of profitable operation under conditions imposed by today's axle weight limit laws.

Duo-scopes are engineered to eliminate unnecessary dead weight and to relocate a greater portion of hoist, body and load weight forward off the rear axles. Teamed with Galion's weight-saving contractor's bodies, they can carry as much as 1,500 lbs. more payload than conventional hoists and bodies.

And, every Galion Allsteel hoist is twice-tested before shipment to protect you against costly down-time.

AA-834

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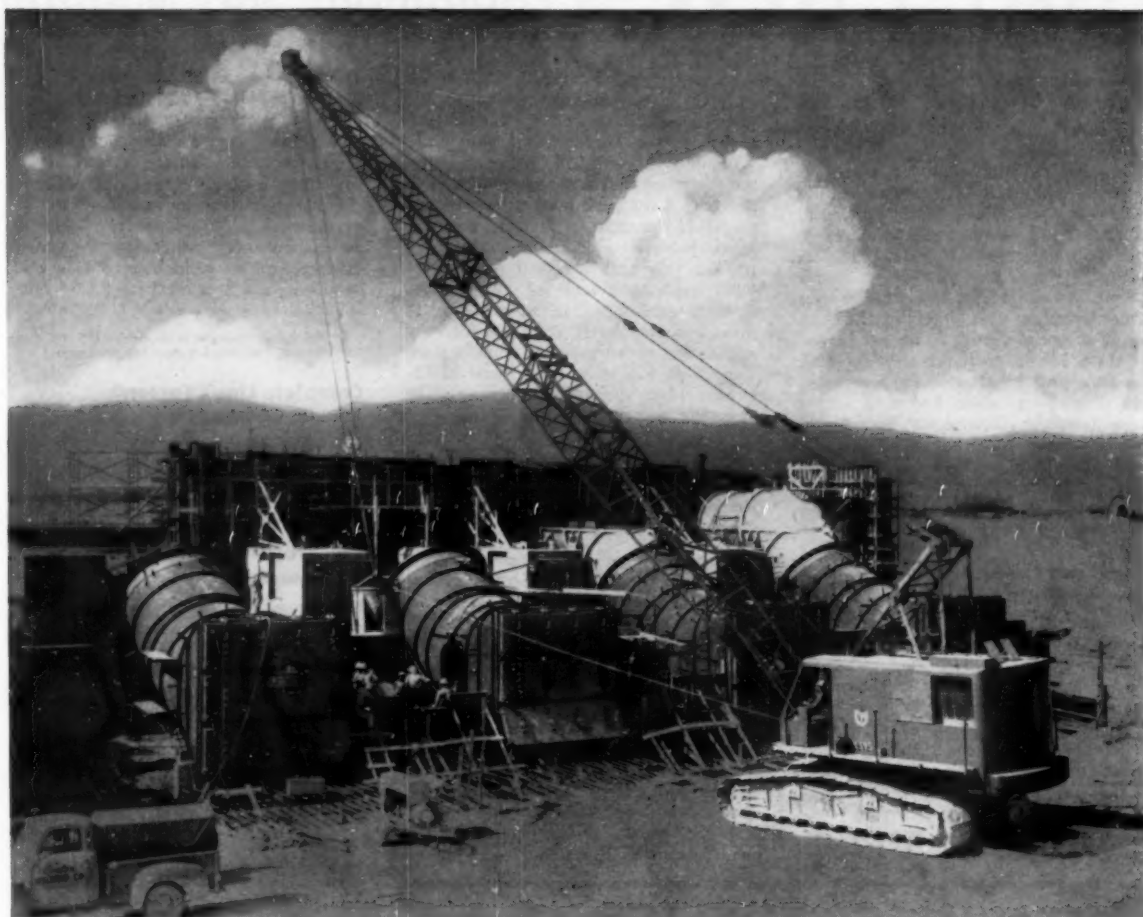


**GALION**

ALLSTEEL BODY COMPANY • GALION, OHIO

A division of Central Ohio Steel Products Company

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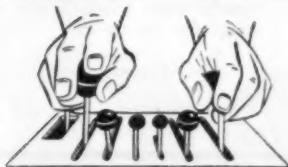
K-595 SPOTTING CONCRETE BUCKET—operator works with greater speed and safety because of greater "live" weight built into every Link-Belt Speeder. All-welded, stress relieved

construction gives greater strength per pound. Alloy cast-iron clutch shells assure superior friction, longer lining life. Independent rapid boom hoist has power control up and down.

## Now every Link-Belt Speeder shovel-crane has *Speed-o-Matic*®

—no lag, no jerk,  
no strain—

**IT'S FULL POWER  
HYDRAULIC CONTROL**



... for more details circle 231, page 12

Today Speed-o-Matic controls are *standard equipment* on every size rig in the entire Link-Belt Speeder line! Full power hydraulic control is your key to 25% extra production . . . more consistent profits in the 1/2 to 3-yard, 6 to 60-ton work range. Here's why:

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- 150 WORKING PARTS ELIMINATED—maintenance costs cut.

Join thousands of alert owners who are making more money with Link-Belt Speeders. Contact your Link-Belt Speeder distributor for details. LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa.

## LINK-BELT SPEEDER

*Builders of a complete line of crawler and rubber-tired shovel-cranes*



# WHAT'S NEW in Equipment and Materials

## New Line Hydraulic Hose and Couplings

A new line of hydraulic hose and couplings, trade named "Surgepruf," for medium-high and high pressure service has been introduced by Joy Manufacturing Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa. The couplings, manufactured to J.I.C. standards, feature a "double-wedge" grip which, the manufacturer claims, makes possible assembly on rubber covered hose without skiving. Through use of a special slotted bushing the manufacturer has made possible retightening the Surgepruf coupling on the hose without disassembly when and if it comes loose through vibration or flexing. No special tools or mandrels are required for assembling Surgepruf couplings on the hose.

For more information circle 101 on Service Coupon this page and mail now.

## Improved Concrete Cutting Blade

A new concrete sawing blade, the Clyde "Duo-Bond" has been developed by the Clyde Co., 712 Florence Ave., Racine, Wis. The blade is the result of many years of research in concrete sawing equipment by its developer, Clyde R. Klicpera — a pioneer in this field, and president of the new firm. The new blade is claimed to substantially reduce concrete cutting costs, especially for contraction joint sawing in new concrete. Secret of the new blade is in an entire-

ly new diamond bond which is fortified through an exclusive process to provide an extremely hard cutting edge which greatly resists abrasion and wear, substantially prolonging blade life and thus reducing costs. The new Clyde blade is stated to have been used extensively on the Ohio Turnpike as well as other major paving projects throughout the country last year with excellent results. Another important feature of Clyde blades is their greater width, so designed to provide a sufficiently wide cut for easy application of all types of joint sealers. The Clyde Co. offers their blade in 12-in. and 14-in. diameters to fit any make of concrete sawing machine.

For more information circle 102 on Service Coupon this page and mail now.

## Packaged Engine Torque Converter Units

Packaged engine torque converter units engineered for the three largest Caterpillar Diesel Engines, D397, D386 and D375, have been announced by Caterpillar Tractor Co., Peoria, Ill. One series of these new packages will be identified as D397-16-1, D386-16-1, D375-16-1. These units consist of the standard engine, radiator (suction or blower fan), three-stage torque converter, output drive shaft, rear support, torque converter fluid cooling system and torque converter fluid charging system designed in conjunction with the engine fuel system so that no special torque converter fluid is required.

The second series of these units are designated as D397-16-2, D386-16-2 and D375-16-2, which are identical to the 16-1 series except a disconnect clutch is applied between the engine and torque converter.

Optional equipment available for all of these units include engine mounted air compressors, output shaft governor drives, ledge mounted base, shallow and deep oil pans, structural steel bases and engine throttle air controls.

For more information circle 103 on Service Coupon this page and mail now.

## Complete Line "Torcon" Torque Converters

A complete line of "Torcon" torque converters for application in heavy-duty,

## More equipment news begins on page 98

off-the-road, vehicles as well as for stationary power plants used in construction, logging, petroleum and other fields is now being produced by Clark Equipment Company's Automotive Division, Jackson, Mich. Believed to be the broadest line of torque converters available from any single source, Torcon units are available in 11, 12, 13, 14, 15, 16, 17, 18, 19 and 26-in. wheels. Of the single stage type, the Torcon line includes rated capacities from 30 to 600 HP. The basic package consists of a standard, mass-produced, heavy-duty torque converter that is available "off the shelf" to engine and original equipment manufacturers, as well as to operators. Basic accessories included with the unit are a pump, cooler and pressure regulator.

For more information circle 104 on Service Coupon this page and mail now.

## New Roller Frames and Idlers for Cat D4

New heavy-duty track roller frames and special large front idlers are now being supplied for the 44 in. gauge Cat D4 track-type tractor by Caterpillar Tractor Co., Peoria, Ill. This new arrangement, consisting of 4-roller track roller frames and idlers and a 32-section track, is claimed to be especially adaptable wherever rough applications on rugged terrain are encountered. These track roller frames are similar to the standard 4-roller frames but are built of box section with replaceable wear strips for the front idler hold-down bearings. This improvement was previously made available for the 60 in. gauge Cat D4 tractor.

For more information circle 105 on Service Coupon this page and mail now.

For more items . . . see page 98

## MAIL THIS COUPON TODAY!

**ROADS & STREETS**  
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Chicago 10, Illinois

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Please send me further information on products and materials mentioned in the February Roads & Streets as circled below

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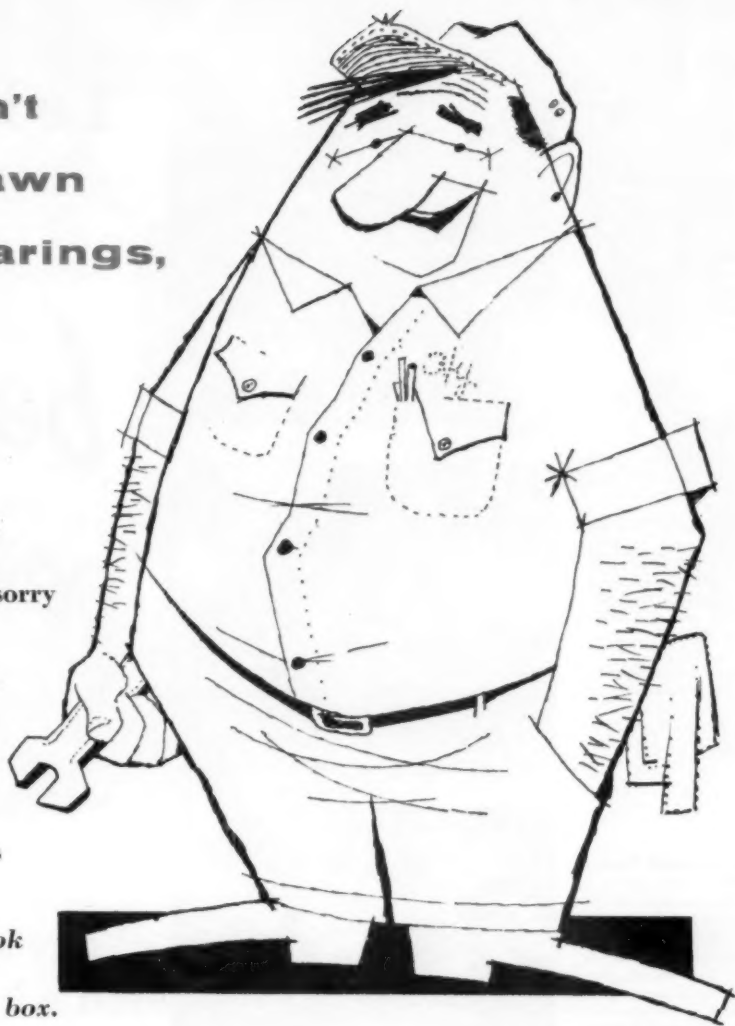
## A READER SERVICE FOR YOUR NEEDS

**you can't  
talk brawn  
into bearings,  
boys!**

**HY SAYS:** Take it from an old-timer—a bearing's either got it, or it ain't. I fell for one o' those slick sales talks for off-beat bearings once myself—but *just once*. Was I sorry I hadn't used Hyatts!

Hyatts were so good they were original equipment when I broke into this game—and *they're even better today!* If you want to be proud of your work and keep your customers happy, just remember this:

There's other bearings that look as good, but you *hold out for Hyatts in the blue and yellow box.* When it comes to *quality,*



**meet HY WHEELER,  
the sage of the  
socket wrench!**

He may have been tinkering with engines before you were engineering with TinkerToys, and he may be quaint, but he's a good man to know. He'll be here regularly from now on to give you a chuckle and some helpful hints. Watch for him!

**there's no  
substitute for...**



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# HYATT

**ROLLER BEARINGS**

STRAIGHT BARREL TAPER

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY  
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**Le Roi-CLEVELAND Sinkers** — with their strong rotation, powerful blow, fast drilling speed, and easy holding, have what it takes to drill more feet per shift. Shown is the 18-lb. H-22 in a stone quarry. Le Roi-CLEVELAND Sinker sizes range from 18 to 80 lbs.



**Le Roi-CLEVELAND DR-30 Wagon Drill** — Air-powered by a 600-Airmaster, this wagon drill puts deep holes down faster, with less air than any other wagon drill available. Its 4-inch bore, Le Roi-CLEVELAND Drifter has strong rotation, powerful hole-cleaning ability and high drilling speed with big bits. For shallow holes, the lightweight Le Roi-CLEVELAND DR-34 is available.



**Le Roi-CLEVELAND Paving Breakers** — really pack a wallop. They are available in sizes from 18 to 80 lbs. Their powerful force of blow is ideally suited for the toughest concrete. This feature, plus easy handling, makes them a favorite with operators who like to get a lot of work done. A protective air cushion in the front end keeps maintenance costs to a minimum.



**Le Roi-CLEVELAND SB30 Pipeline Rig** — This adjustable, multiple drill rig, consisting of four, 4-inch, air-feed drifters hung from a side-boom tractor, was pioneered and developed by Le Roi-CLEVELAND for trenching in hard rock. Because of its flexibility and drilling power this rig is also ideal for cutting costs on road jobs or wherever you have big rock cuts. On this road job in Pennsylvania the SB30 drilled 275-300 feet per hour.



**Le Roi Air Power  
helps**

*beef up  
your profits*



**LE ROI GIVES YOU MORE  
FOR YOUR MONEY!**

*More air power!  
More footage!  
More profits!*





Le Roi Airmaster running 2 Le Roi-CLEVELAND Model 52 80-lb. breakers. Airmasters are available in 85, 105, 125, 185, 210, 250, 365, and 600-cfm sizes; gas or diesel.

## ... that's why it pays you to use Le Roi Airmaster Compressors and Le Roi-CLEVELAND Air Tools

YOU'VE probably said to yourself, "What equipment do I need to meet competitive bidding — how am I going to improve my profit picture?"

Well, Le Roi has the answer, when it comes to your air power needs. We build the widest range of portable air compressor sizes and models available. You have 8 sizes and 14 models to choose from. You can pick the machine exactly suited to your job requirements — the machine that does the most work at the least cost to you.

And so that you can get the most out of the high

efficiency that's designed and built into every Le Roi Airmaster, we recommend the use of Le Roi-CLEVELAND Air Tools. These tools — sinkers, breakers, drifters, tampers, wagon drills, spades — all have their own exclusive valve design. That's why they are easy to hold, why they have the right kind of blow, why they squeeze the most out of Le Roi air power, why they get more work done.

Yes, Le Roi can help you beef up your profits. Find out for yourself what Le Roi can do for you. See your Le Roi distributor or write us.



PORTABLE AIR COMPRESSORS • TRACTOR • STATIONARY AIR COMPRESSORS • ENGINES • AIR TOOLS • TRUCK MIXERS • FRONT-END LOADERS

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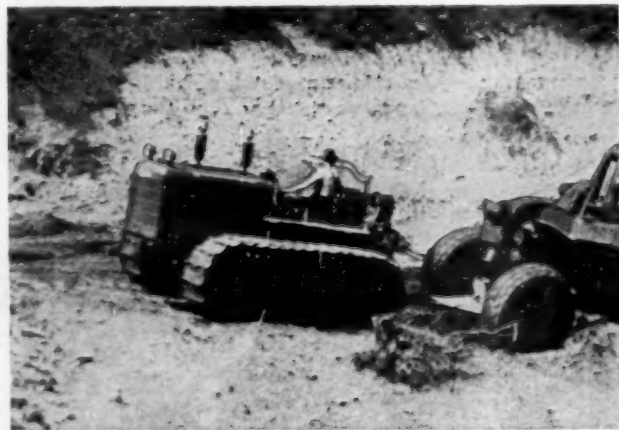
**DAM FOR CORDRY LAKE**, 700 feet thick at the base, is built by this fleet of three INTERNATIONAL TD-18A crawlers and scrapers and one INTERNATIONAL TD-14A with hydraulic dozer used for push-loading on inclines and in soft spots, and some other equipment.



**LAKE LEAKAGE** is eliminated by removing all porous soil and stone from the site of the dam base and replacing it with impervious clay fill from distances up to 1,000 feet from a nearby hill.



**BUILDING UP THE DAM BASE** moves along on schedule as one of three TD-18A scraper combinations brings a heaping load of clay to the construction site.



# Moves 1,000,000 cubic yards to build a lake

Howard Prince, veteran Indiana contractor, has used INTERNATIONAL crawlers to build more than 100 lakes since 1935—and he has two large lakes under construction right now!

A water shortage is being remedied and a new vacation area opened by a chain of fourteen lakes being built across Brown County, Indiana, by veteran lake builder Howard Prince, head of the Prince Lake Building Company, Nineveh, Indiana.

Latest and largest in the chain is Cordry Lake, the 103rd lake to be built by Prince.

Cordry Lake, which will eventually cover more than 600 acres, is being created by building a dam 750 feet long, 120 feet high, across two small streams. In excavating unsuitable material from the dam site and borrowing leakage-proof clay from a nearby hill, the lake builders will move over 1,000,000 cubic yards of dirt.

The entire job is being handled by Prince's fleet of seven INTERNATIONAL crawlers with matched IH scrapers and blades, and some other equipment.

Howard Prince has been an INTERNATIONAL owner ever since he first started in business, and states: *"I bought my first INTERNATIONAL crawler in 1935 and I've been using them ever since."*

*"I've been increasing my INTERNATIONAL equipment until I now have three TD-18As with scrapers, two TD-14As with blades, a TD-9 and two TD-6s on this job."*

*"On lake building projects, as well as all other types of work, they have proved both dependable and economical through the years."*

Get the same information that has enabled this successful contractor to make such wise equipment buys for 20 years. Call your INTERNATIONAL Industrial Power Distributor today. From the world's most modern line of earthmoving equipment he'll select the machine "right" for your job and demonstrate it on your job any time you say.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.



**INTERNATIONAL**  
INDUSTRIAL POWER

MAKES EVERY LOAD A PAYLOAD

**REMEDY FOR NATURE'S OVERSIGHT.** The Brown County Lake Development project is adding immeasurably to the natural beauty of that Hoosier county by building 14 lakes in an area that has all the scenic wonders except lakes.



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# What they're saying about LORAIN "E-Z" CONTROLS

"Switching between our other machine and this new 'TL' makes me really appreciate these new, easy controls."

Operator Al Hallett, Lorain County Excavating Co., Elyria, Ohio

"Hell, I wouldn't kid you . . . this 'TL' is a sweet running machine."

Operator Del Marous, Trebec Excavating Co., Euclid, Ohio

You'll be hearing more and more statements like these as more and more operators discover the surprising and extremely easy operation of the new Thew-Lorains in the  $\frac{1}{2}$  and  $\frac{3}{4}$  yd. classes. An entirely new idea in the operating controls of these machines has reduced operating effort by as much as 70% . . . plus faster machine response and higher output. But — the actual proof is in the field, where many new Lorains are swinging, hoisting and moving so much easier and faster that operators are putting their "OK" on them enthusiastically. If you believe a happy, satisfied operator will move more dirt and make more money for you, check with your nearest Thew-Lorain Distributor.



## FAST AND EASY DOES IT ...HERE'S HOW!

1. Streamlined levers on roller bearings.
2. Simplified linkage with anti-friction bearings.
3. New shoe clutches that require no dead-end adjustment.
4. New Hoist and Drag Shoe Clutches with spring-loaded live ends — easier to operate, reduces adjustment.
5. New clutch cones toggle-in clutches without latches or other effort than applying the hand lever.

## HYDRAULIC POWER CRAWLER CONTROLS FOR ...

6. Swing Lock.
7. Tread Locking Pawls.
8. Jaw Clutches for selection of Swing or Travel.
9. Crawler Steering.

GET THE FACTS TODAY

# THE W LORAIN.

THE THEW SHOVEL CO., LORAIN, OHIO

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## ROADS AND STREETS

Sixty-Three Years of Editorial Leadership

# Washington News Letter



By Duane L. Cronk

February 8, 1955

Reaction to the Clay Committee report came swiftly on the heels of its publication in Washington last month. A National Conference on Highway Financing, sponsored by the U. S. Chamber of Commerce a few days after the report was made to the President, became a sounding board for both warm approval and disagreement with its recommendations.

Broad general acceptance was the consensus, but individual points of the study drew immediate rebuttal from several wrathful highway organizations. Among the issues clearly controversial were:

- The committee's decision not to recommend how state and local roadbuilding funds should be raised.
- The recommendation that states should be reimbursed for future, as well as past, toll road construction.

\* \* \*

Major recommendation of the committee, that Uncle Sam put up \$25 billion for construction of the National Interstate System and that the funds be raised by bond issues, was generally approved. This would leave \$29 billion for state and local governments to come up with, in addition to current outlays, as their contribution to the \$101-billion program.

The Clay Committee bluntly stated that it would offer "no suggestions" for the raising of this share, thereby easing away from the most tortuous problem of all, some declared.

These critics believed that the \$101-billion program would thus be cut down by default to something considerably less. Charles L. Dearing, Brookings Institution economist, noted that the report "is silent on how the states, counties and cities are to deal with the 70% of the problem, the rural road and the city street." Mr. Dearing saw the urban problem remaining "as far from solution as ever" and even "getting worse."

\* \* \*

State and local governments must come up with their own solutions was the consensus of those who recognized the void in the Clay report.

Governor Robert Kennon of Louisiana, chairman of the Governors' Conference, admitted, "We were doing poorly in providing state money, but Eisenhower has woke us up." He urged the conferees to go home and "tell your state legislators they have got to come up with their share."

(Continued on next page)

Highway Commissioner F. D. Merrill of New Hampshire also put the finger on state responsibility. "It is incredible that any state would slow down its effort," he asserted. "This program will stimulate state efforts."

Agreeing with him was Glenn Richards, Detroit highway official. "The heat will be on for better local roads, just as quickly as people get a look at what can be done on the main routes. Most states will be under pressure to do as good a job on their own systems as Uncle Sam will do on the Interstate."

\* \* \*

The struggle at state level for highway funds will continue to be fierce, predicted Dr. Frederic Guild, director of the Kansas Legislative Council's Research Department. "Realistically speaking," he said, "I doubt very much if cities, counties and states will be able to do much for four or five years to meet their responsibilities."

The Clay program is fine for taking care of the major routes. But it does not provide a single argument that can be used on the farmer, who has got a veto - an absolute veto - in the state legislatures. He is the majority and you have got to sell your state highway programs to the majority."

Pessimism over the possibility of either increased city or county taxes to aid state road hopes was voiced by a Wisconsin county board chairman, Lester Palmer, and Mayor Ben West of Nashville. "If it comes to raising local taxes to do the job," another observer noted, "then, apparently, we won't get the new roads."

\* \* \*

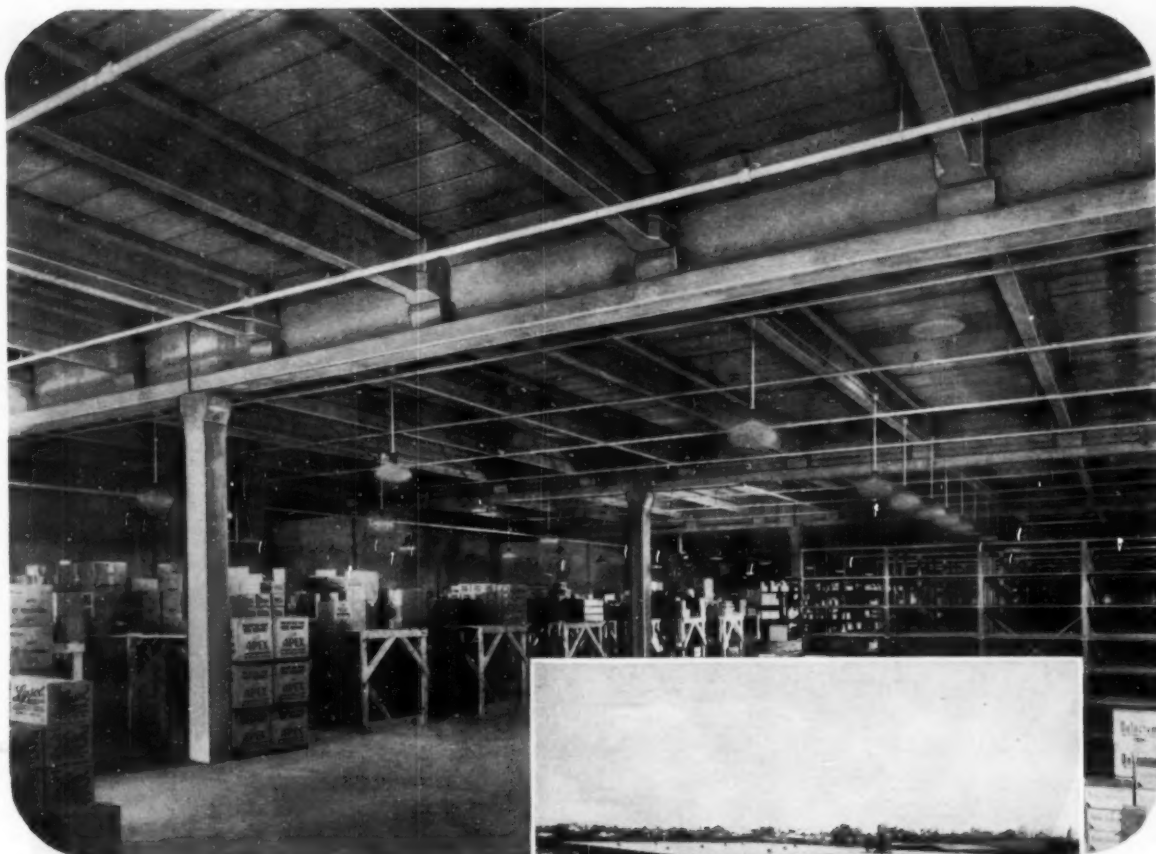
Touching off the most controversial issue of the report was Clay's recommendation that states be reimbursed for money spent on toll roads on the National Interstate System. The funds may be used for construction on other federal-aid systems in the state, and theoretically opens the door for more than 6,400 miles of future road construction by toll financing.

This is a definite incentive for states to go ahead with all feasible toll road plans, General Clay believes. The reimbursement money would be an outright grant; no matching money required. Before picking up this money, however, a state must have matched all other federal aid allocated to it.

\* \* \*

The proposal came as a surprise and disappointment to many highway men in Washington. Particularly dismayed were long-time advocates of the Interstate System as a "free" network and highway users who would thus bear the brunt of much costly construction.

A complete study of the whole urban transportation problem should become a major objective of highway research engineers, G. Donald Kennedy, chairman of the Highway Research Board, told a meeting of traffic engineers in Washington last month. A special committee of the Board on "urbanization" has been authorized, he said.



ABOVE: View of girders on column tops and purlin framing in girders. Design live load, 30 lbs. per sq. ft.; column centers, 37' x 33'. Girders, purlins and columns supplied by Alatec Construction Service Inc., New Orleans. AT RIGHT: General view of completed warehouse, dimensions 185' x 266'. . . Consulting Engineer, Walter E. Blessey; Architect, George M. Leake; General Contractor, A and O Builders Inc., all of New Orleans.



## 50,000 SQ. FT. PRESTRESSED WAREHOUSE ERECTED IN 18 DAYS

THAT'S THE STORY of the new Myer Brothers Drug Company warehouse and office building in New Orleans . . . the entire framework including precast Perlite roof slabs erected in 18 working days. Both the 36-in. deep "T" section girders and the 22-in. deep "T" section purlins are prestressed with Roebling  $\frac{3}{8}$ -in. diameter 7-wire stress-relieved strands pre-tensioned and bonded to the concrete. The prestressed members plus the precast reinforced concrete columns were purchased at an in-place cost of only 70 cents per sq. ft.

. . . for more details circle 203, page 12

Roebling engineers, pioneers in the development of prestressing techniques and tensioning elements in America, will welcome the opportunity to cooperate with you to help assure maximum efficiency on any specific prestressed concrete application. Write Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, N. J.



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## "LET'S SEE..."

### Let's drive on concrete tonight!"

"Let's see—we could take a shorter route but the gas station man says this one is concrete all the way. We'll make better time because we can see where we're going on concrete. Yes, let's *see*! Let's take the concrete road!"

Millions of motorists make this wise decision. There's good reason for it. In one test, the Illuminating Engineering Society found that the light reflectance on concrete pavement is 20%, on dark pavement as little as 5%!

And in the State of Washington, a 1952 survey showed 63% more nighttime accidents occurred on dark pavement than on concrete as compared with 50% more in daylight!

Studies like these prove conclusively how important good visibility is to safe driving at night, when most accidents occur. *Simple logic says you can't be safe if you can't see!*

Motorists look to engineers and public officials for safe roads. They know that at night safety depends upon a road surface with high light reflectance. Only concrete has it. For safety's sake pave all main highways with concrete.



Concrete's high light reflectance illuminates the road farther ahead. Drivers can see curves, pedestrians and obstacles in the road in time to slow down or to stop.



Taken with the same car lights, this photo shows how dark pavement absorbs light and reduces visibility. For nighttime driving safety, motorists must be able to see.

**PORTLAND CEMENT ASSOCIATION** 33 West Grand Avenue, Chicago 10, Illinois

A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work

... for more details circle 201, page 12

# Pace-Setting HD-5G Tractor Shovel

## NOW BETTER 3 WAYS



From the time of its introduction seven years ago, the Allis-Chalmers HD-5G Tractor Shovel has been tops in popularity. Many thousands are daily proving their ability and versatility on all kinds of material handling and excavating jobs.

Now, design refinements make the HD-5G a three-way better value than ever before:

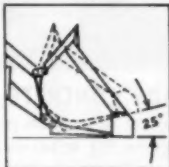
### 1. Has Bigger Rated Capacity

New bucket handles a big 1 1/4-yd load — streamlined design now helps roll in large loads with less tractor effort. The back of the bucket has been brought forward and the sides extended to cut spillage, put more payload where it's wanted.

### 2. Helps the Operator Do More

Cleaner dumping with the new bucket saves the operator time and effort shaking out loads.

For added versatility, there is a two-position bucket available with both standard automatic return to digging position and operator-controlled tip-back. If the operator chooses to use the controlled tip-back, he can load the bucket, then tip it back approximately 25° before raising, assuring maximum output under special conditions such as downhill loading or loading loose materials.



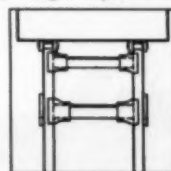
The HD-5G helps the operator do more in other ways, too — giving him full vision, fast and easy control, cleaner platform and more comfortable seat from

... for more details circle 229, page 12

which to work, and more working time with truck wheels, support rollers and idlers that need greasing only once every 1,000 hours.

### 3. Works at Lower Cost

The HD-5G now works at even lower cost than ever before — not just because it *does more*, but because it has features that mean *less maintenance, longer life*. For instance, new type tubular bracing on the bucket booms provides added strength and support, keeps the bucket in line. The floor at the rear of the new bucket has been raised seven degrees to reduce wear on the bottom sheet. Heavy-duty truck wheels and idlers are available for particularly tough working conditions. One-piece, full-length main frame permits unit construction so that major assemblies can be removed without disturbing adjacent units, putting tractor back on the job in hours rather than days.



### Ten Quick-Change Attachments Add to HD-5G Versatility

Bulldozer	Crane Hook	Tine Fork
Angledozer	Light Material Bucket	Rock Fork
Narrow Bucket	Trench Hoe	— also rear-mounted Ripper
Rock Bucket	Lift Fork	

See your Allis-Chalmers dealer for more about these and other production-boosting features of the popular HD-5G Tractor Shovel.

# ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



**KWIK-MIX 16-S DANDIE®**

**handiest mixer  
you've ever seen**

**LOADS TRUCKS** — Producing concrete for curbs and gutters, a Kwik-Mix 16-S Dandie mixer dumps batch directly into truck from ground level. Tower loader attachment gives 9 foot-2 inch discharge height. Big-capacity bucket holds full 17.6 cu. ft. mixer batch. It is powered by the mixer engine, dumps automatically at top of tower. Bucket travel and discharge are completed while the next batch is being



**SETS UP AS CENTRAL-MIX PLANT** — on bridge construction, two Kwik-Mix 16-S Dandie concrete mixers, with wheels removed, were set up side-by-side as permanent mix plants. Both were equipped with tower attachment for truck-loading operation. These big-capacity mixers also can be set up as stationary plants on elevated platforms by adding an extension track to charge the drum.

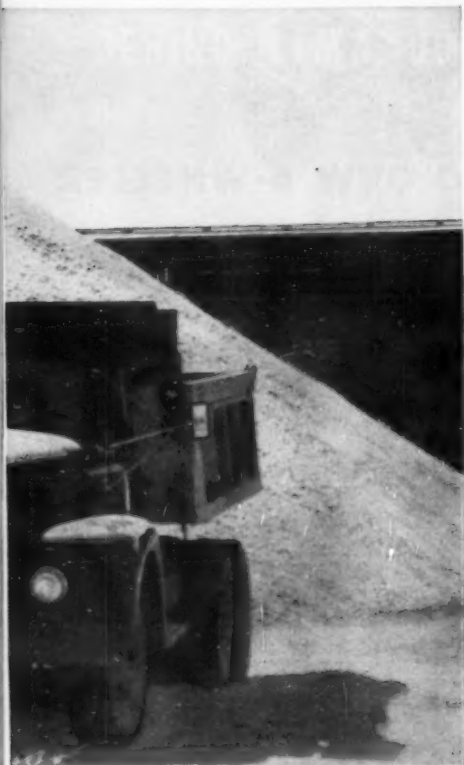


**LOADS CONCRETE BUCKETS** — Working on a state highway relocation project, this mobile 16-S Dandie mixed concrete for a series of box culverts — discharged batch into concrete bucket. To suit operating conditions, this versatile Kwik-Mix 16-S mixer is adaptable to side or end discharge. Axles are readily interchangeable on the square mixer frame. Change-over is easy, takes less than an hour.

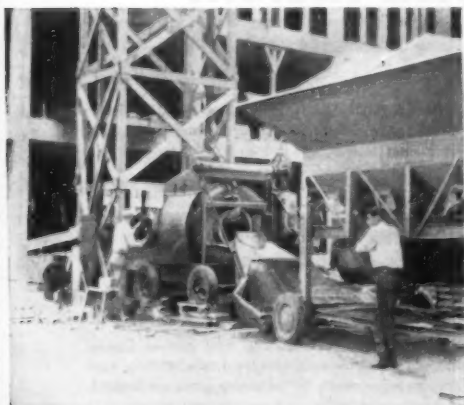
**KWIK-MIX COMPANY, Milwaukee 16, Wis.**

(Kochring  
Subsidiary)





mixed. There's no delay to mixer production. Tower is easily attached. Top section is hinged, folds back for ample travel clearance. Tower loader attachment is also available on the 11-S Dandie concrete mixer, and on Kwik-Mix 10 and 14 cu. ft. bituminous mixers.



**TEAMS UP WITH BATCHER** — Concrete for a new apartment building was produced on the job by this Kwik-Mix 16-S mixer and Johnson Lq-Bin batcher — a low-cost, big-production team. (Other sizes in Kwik-Mix line include: 11-S, 6-S, 3½-S Dandie mixers.)

**Kwik-Mix Concrete Mixers**  
 bituminous mixers. **Johnson**

## Johnson ¾ to 3-yard Clamshell Buckets

Smooth inside and out, Johnson all-welded clamshells dig and dump with less resistance . . . give fast clean discharge. They're quick-filling, easy-closing, because big needle bearing-mounted sheaves reduce friction loss, deliver full digging power to cutting edge. Hard manganese edge, welded to heavy lips, toughens with use. 3 types, 10 sizes: ¾ to 3 yds. Also check Johnson line of concrete plants, bins, batchers, hoppers, silos.

**C. S. JOHNSON • Champaign, Ill.**  
*(Koehring Subsidiary)*



## 215 Trenchliner® digs 18 feet per min.

With 30 digging feeds, this cross-country 215 Trenchliner digs 6 in. to 18 feet per min., 13 to 31 in. wide, up to 6 ft. deep. Square or round-bottom buckets have "easy-in, easy-out" Tap-In teeth. Standard tractor-type crawlers have 18-in. treads, lug-type shoes. Other Parsons Trenchliners: wheel-type 202 for drainage and utility work; 3 ladder-types, full crawler mounted; and the mobile, utility size rubber-tired Trenchmobile®.

**PARSONS • Newton, Iowa**  
*(Koehring Subsidiary)*



## Koehring ½-Yd. 205 has 10 or 15-ton lift

On clamshell, dragline, or lift crane operation, you gain an important advantage in extra load capacity with Koehring heavy-duty 205. On crawler mounting, it has 10-ton lift capacity, and boom lengths of 30 to 50 feet. As a rubber-tired truck crane, it safely lifts up to 15 tons. Maximum boom length is 55 ft. Quickly converts to ½-yard shovel or hoe. Three other Koehring sizes up to 2½ yards . . . crane lift capacities up to 79½ tons.

**KOEHRING Company**  
 Milwaukee 16, Wisconsin

264



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# NEW

## INTERNATIONAL 60,000 GVW 6-WHEELER

With New 212 hp. Royal Red Diamond Engine



There's a new model in the INTERNATIONAL line of 6-wheelers — a model with the power to haul capacity loads over the roughest terrain — a model built to absorb severe loading shocks, and with ability to move heavy loads long distances over-the-road at maximum safe speeds.

The new RF-230 is powered by the new INTERNATIONAL 212 hp. Royal Red Diamond 501 engine delivering 444 lb-ft torque at 1600 rpm. It has hydraulic full-power steering, 12-volt electrical system, other features. Engine and all components are precisely coordinated to assure maximum operating economy, minimum maintenance and long life.

This newest INTERNATIONAL is Tough-Job engineered like all INTERNATIONALS — has a surpassing measure of the performance, strength and stamina qualities that have made INTERNATIONAL the 6-wheel sales leader for 20 straight years. It is built to do big jobs, save big money. Get full facts from your INTERNATIONAL Dealer or Branch.

### QUICK FACTS...

**GVW rating,** 60,000 lbs.

**Wheelbase,** 175 inches; optional wheelbases available.

**Engine,** INTERNATIONAL Royal Red Diamond 501, 4½-inch bore, 5¼-inch stroke, 501 cu. in. displacement. Max. hp., 212 at 3000 rpm. Max. torque, 444 lb-ft at 1600 rpm.

**Frame,** double, heat-treated alloy steel. Two 15,000 lb. capacity front tow hooks, standard.

**Clutch,** 15-inch single plate with vibration damper.

**Transmission,** direct-in-fifth main plus overdrive auxiliary.

**Standard equipment** includes hydraulic full-power steering, air brakes, 12-volt electrical system.

**Optional equipment** includes LPG fuel system, Comfo-Vision space saver cab for maximum front axle loading; high altitude engine equipment; tinted safety glass all around.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

International Harvester Builds **McCORMICK**® Farm Equipment and **FARMALL**® Tractors... Motor Trucks... Industrial Power... Refrigerators and Freezers

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# INTERNATIONAL® TRUCKS

"Standard of the Highway"

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BEHIND **LIMA** QUALITY



## Heat treating gives **LIMAS** greater strength and longer service life

In the 1500 degree F. circle, formed by this battery of gas burners, is a shipper shaft pinion destined to become a vital part of a LIMA shovel. This heat, the succeeding water quench and controlled tempering process, establishes a uniform hardness up to two inches in depth to the teeth and teeth base of the pinion. This means longer serviceable life to this important part.

Flame and induction hardening are used on rollers, gears and shafts of every LIMA machine. Heat treating, used with our know-how, is one of the reasons why LIMA is known throughout the world for quality—cost-conscious equipment men everywhere are saying, "you can depend on a LIMA for low maintenance and less down-time."

**COMPARE QUALITY!** No other machine gives you as much as LIMA!

1. Piston ring type dirt seal rings and retainers in crawler rollers.

LIMA Type 604—1½ yd. shovel on highway work in Colorado.



2. Moving parts are flame or induction hardened for longer life.
3. Main machinery is placed well back of center of rotation.
4. Anti-friction bearings at every vital bearing point.
5. Big capacity drums and sheaves are easy on cables.
6. Propel and swing gears and power take-off are enclosed in a sealed oil bath.
7. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

The above advantages contribute to LIMA'S greater output, less down-time and lower maintenance.

**COMPARE** and you'll specify LIMA for shovels (¾ yd. to 6 yds.), cranes (to 110 tons) and draglines (variable). Smaller capacities available on rubber.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD



**LIMA** SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

**BALDWIN-LIMA-HAMILTON**

Construction Equipment Division • LIMA • OHIO • U. S. A.

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CLEVELAND BURLERS SUPPLY CO. Cleveland, Ohio									
No.	YDS.	MIX	SAND			1			CONT.
6.25	6		10,000	1,000	100	10	8	4	2
TYPE	10,000	1,000	100	10	8	4	2	1	
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WATER		8 4 2 1	8 4 2 1	8 4 2 1	8 4 2 1	8 4 2 1	8 4 2 1	8 4 2 1	2 1

## CARD-CONTROLLED BATCHING is here ... and BUTLER has it!

A punched card now can be your batching operator. The human element — the chance of error — is gone. No dials to set, no levers to pull. The punched card does it all in the new BUTLER XK1 Electronic Batcher.

Selection, proportioning, filling, weighing and discharge of 6 aggregates, 3 types of cement — plus water — are automatic and completely interlocked. Every discharged batch is correct — to a split pound . . . Another feature never before offered: The electronic controls also compensate for moisture in

sand or aggregates — and further, compensate for that compensation.\*

\*NOTE: To the mathematically minded: For example, 5% moisture in the whole is also adjusted for the correlary percentage in the adjustment. In other words, it integrates successive increments.

### Batching at 186,000 miles per second.

The BUTLER XK1 Batcher combines the accuracy and sensitivity of weight control, the flexibility of punched card systems and the speed of electronics, which is the speed of light.

### Virtually infinite batching selections.

From the holes punched in the card, the electronic control unit predetermines ingredient type, desired weight for each ingredient and the sequencing. An astronomical number of combinations of batch proportion is instantly available to the operator. A batch may be repeated at once or next year with equal ease. With the proper auxiliary equipment, bookkeeping, pricing and invoicing could also be handled from the same punched card.

### Permanent, legal record.

Those cards constitute a permanent file instantly accessible for repeat orders. Further, the cards are tamper-proof, legal records of the exact weights and proportions of materials in every batch. Successive batching of the same combination is simply a matter of touching the starting button after each cycle.

### Quick, easy maintenance.

Maintenance of the electronic equipment is so simple that any local radio repairman is perfectly capable. Moreover, unitized circuits permit any element to be replaced as quickly as a light bulb, so that it can be serviced at leisure.



# You Produce Concrete . . .

## TAKE a LONG, CLOSE LOOK at this CARD



### One man for a two-man job.

The control cabinet can be located in the dispatcher's office — at a distance from the plant — and the dispatcher can operate the batchers directly.

### New Horizons.

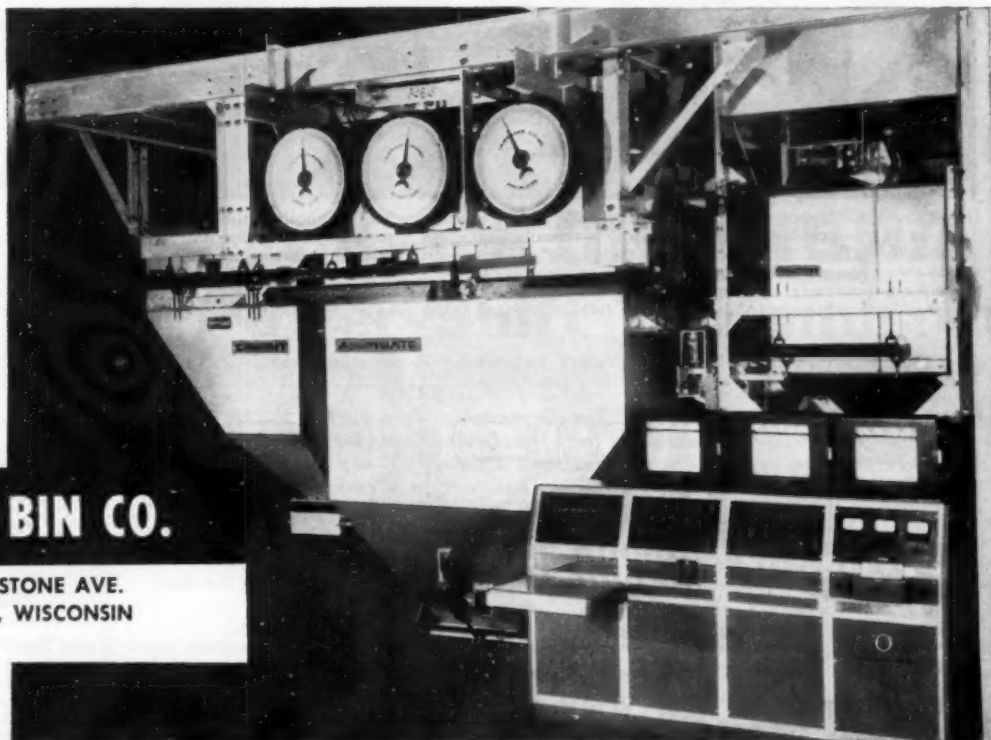
This great BUTLER development is of revolutionary importance to those in the concrete industry who are concerned with the complete integrity of their product and who wish to provide new horizons of economy, accuracy, flexibility, sensitivity and speed for the benefit of themselves and those whom they supply.

### As An Historical Note.

The first BUTLER XK1 Electronic Batcher was developed by the Butler Bin Company with its vast experience in batching problems together with Fairbanks-Morse and Company, Electronics Division, which has pioneered and established leadership in the electronics field. It has been installed at the Cleveland Builders Supply Company in Cleveland, O.

### You, too, can benefit.

Existing concrete plants can readily be converted to BUTLER XK1 equipment, no matter what make of your plant. Your Butler Engineer will be glad to supply all data — but please, make your inquiry on your letterhead.



## BUTLER BIN CO.

959 BLACKSTONE AVE.  
WAUKESHA, WISCONSIN

... for more details circle 168, page 12

When writing advertisers please mention **ROADS AND STREETS**, February, 1955





**More Than Enough Power to Swing Full Moldboard Loads, Yet Gentle As a Lamb for Fine Grading — that's *SPEED GRADER!***



If you've kicked around motor grader specifications, chances are you have concluded that there are only two really important yardsticks: 1. Does the grader deliver the *kind of power* needed to do every conceivable job? 2. Will *this grader* rid us of downtime for unnecessary maintenance? Consider Speed Grader. It delivers so much power you can swing full moldboard loads

360° without jamming circle controls! Yet, when you want a tea-party touch for fine, exacting work, Speed Grader's tremendous power is readily bridled. Maintenance downtime? What's built right, works right—the four key features below show Speed Grader's superiority on this point. Bulletin P136 enlarges on the advantages of having these features. Ask for it!

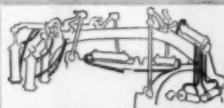
**STRONGEST FRAME**



**HEAVIEST TANDEM**

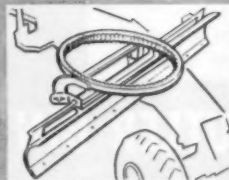


**HYDRAULIC CONTROL**



**Without an Equal**

**MOST CIRCLE POWER**



**PETTIBONE**

**SPEED GRADER**

*Eliminates the Weaknesses of All Other Graders!*



*Another Member of the Labor-Saving "Speedy" Material Handling Family!*

**PETTIBONE NEW YORK CORP.**

Rome, New York • Telephone 3151

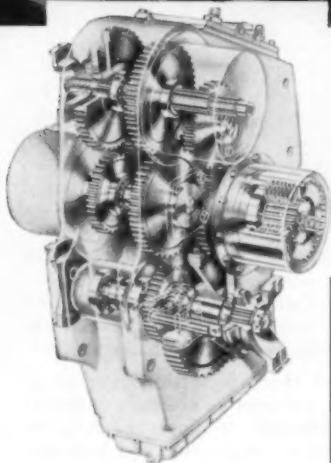


Yes, when you compare Speed Grader feature for feature with all other leading motor graders, you will find that *no other single grader* has all 17 features Speed Grader offers. Write for Bulletin No. P136 showing these 17 features. Complete specifications for the five Speed Grader sizes will also be sent. You'll see why Speed Grader offers a wonderful profit future to you.

... for more details circle 199, page 12



Driver's left hand rests on power-shift levers—there's no clutch pedal



**Here's the secret of  
BIG TIME-SAVINGS:**

the MICHIGAN Power-Shift Transmission! Forward-Reverse and High-Low gears are in constant mesh. Shifting is accomplished by hydraulic pressure. The power-shift levers on the steering column actuate control valves in the transmission. These valves direct oil pressure to the multiple disc-clutches, transmit engine power from the selected drive gears to the output shaft. Hydraulic oil completely lubricates all drive gears and bearings as it flows from top to bottom and returns to the sump through a fine-mesh screen.

# *You'll cut your loading time!* **with the MICHIGAN Power-Shift Transmission**

Operating a MICHIGAN Tractor Shovel is both fast and easy. Gone is the old-fashioned heavy duty foot clutch; gone is the tiresome work of clutching every time you shift gears.

The MICHIGAN Power-Shift Transmission does all the work for you. All you do is operate the fingertip hand levers on the steering column . . . one for Forward-Reverse, the other for High-Low speed. Make either shift *while moving in either*

*direction without coming to a stop.*

The MICHIGAN'S power-shift transmission speeds up operation, cuts loading time, gets you TOP YARD-AGE per day.

Get a demonstration right on your own job. It is easily arranged: just phone your MICHIGAN distributor. Did you know MICHIGAN Tractor Shovels are available under the Clark Leasing Plan? We would be glad to send you full details.



**CLARK EQUIPMENT COMPANY**  
Construction Machinery Division  
394 Second St., Benton Harbor 25, Michigan

(Advertisement)

One of 17 A-C tractors, with Gar Wood dozers and cable control units, used by Yonkers Contracting Co. on their Maine Turnpike Contract.



## Dozing on the Turnpikes from Maine to Ohio!

*S. J. Groves & Sons Co.  
rip into tough going  
with Gar Wood  
equipped HD-20 on  
Ohio Turnpike contract.*

Work on the big, new super-highways is in high gear this summer with contractors moving mountains of earth on projects throughout the country. As usual Gar Wood dozers on Allis-Chalmers tractors fitted with Gar Wood cable control units, are handling a big share of the earthmoving on these major construction jobs.

Up in Maine, work is progressing on the second section of the Maine Turnpike — another high-speed, four lane divided highway running from Portland to Augusta.

On a contract for grading and draining an 11 mile stretch outside the twin cities of Lewiston-Auburn, Yonkers Contracting Co. is using 15 big Allis-Chalmers HD-20s and 2 HD-15s, all Gar Wood equipped, for stripping and spreading fill on the job. Over 3,000,000 yds. of dirt and 100,000 yds. of rock are involved in the contract.

In the photo at top, Yonkers Contracting Co. uses one of their 17

tractors, with Gar Wood dozers and cable control units, to spread fill for compaction by a sheepsfoot roller pulled by the same tractor.

Moving westward, contractors on New Jersey's tremendous new Garden State Parkway, from Cape May to the New York state line — and on the 500 mile New York Thruway, are using fleets of Gar Wood equipped Allis-Chalmers tractors in an effort to rush completion of the majority of the work by the end of the current working season.

In Pennsylvania preliminary work on extensions to the Pennsylvania Turnpike is underway and digging and dozing is swiftly progressing along the entire length of Ohio's big, new \$283 million Turnpike.

In the photo at left, S. J. Groves & Sons Co. use one of their many Allis-Chalmers HD-20s, equipped with Gar Wood dozer and cable control unit, to rip into sandy clay, clogged with tree and shrub roots, along the right-of-way of their 12.9 mile, 1,750,000 cu. yd. contract. Groves is only one of the many contractors using Gar Wood equipment on these vital toll road links between the Atlantic Seaboard and Chicago.

When there is earthmoving to be done, contractors everywhere specify Gar Wood! 15 dozer models, designed for both cable and hydraulic operation, are available for all Allis-Chalmers crawler tractors. Gar Woods's dozer line is supplemented by a complete line of front and rear mounted cable control units for any dozer-scraper operation.

**GAR WOOD INDUSTRIES, INC.**

WAYNE, MICHIGAN



M-1029 N

... for more details circle 230, page 12



# All ADAMS Motor Graders now equipped with NEW Constant-Mesh Transmission



Plus these time-saving,  
work-producing features  
available in no other  
single grader—

- **8 FORWARD SPEEDS**  
Up to 26 mph. for fast transport.
- **3 CREEPER SPEEDS**  
Low as 1/4 mph. (optional).
- **4 REVERSE SPEEDS**  
Up to 13 mph. Save time on shuttle work.
- **DUAL BRAKING SYSTEM**  
Provides quicker, easier, safer stops,  
with less pedal effort.
- **RUBBER-MOUNTED ENGINE**  
Floating power—no vibration trans-  
mitted to grader.
- **FOOT ACCELERATOR**  
For easier, safer overland travel.

#### ADAMS DIVISION

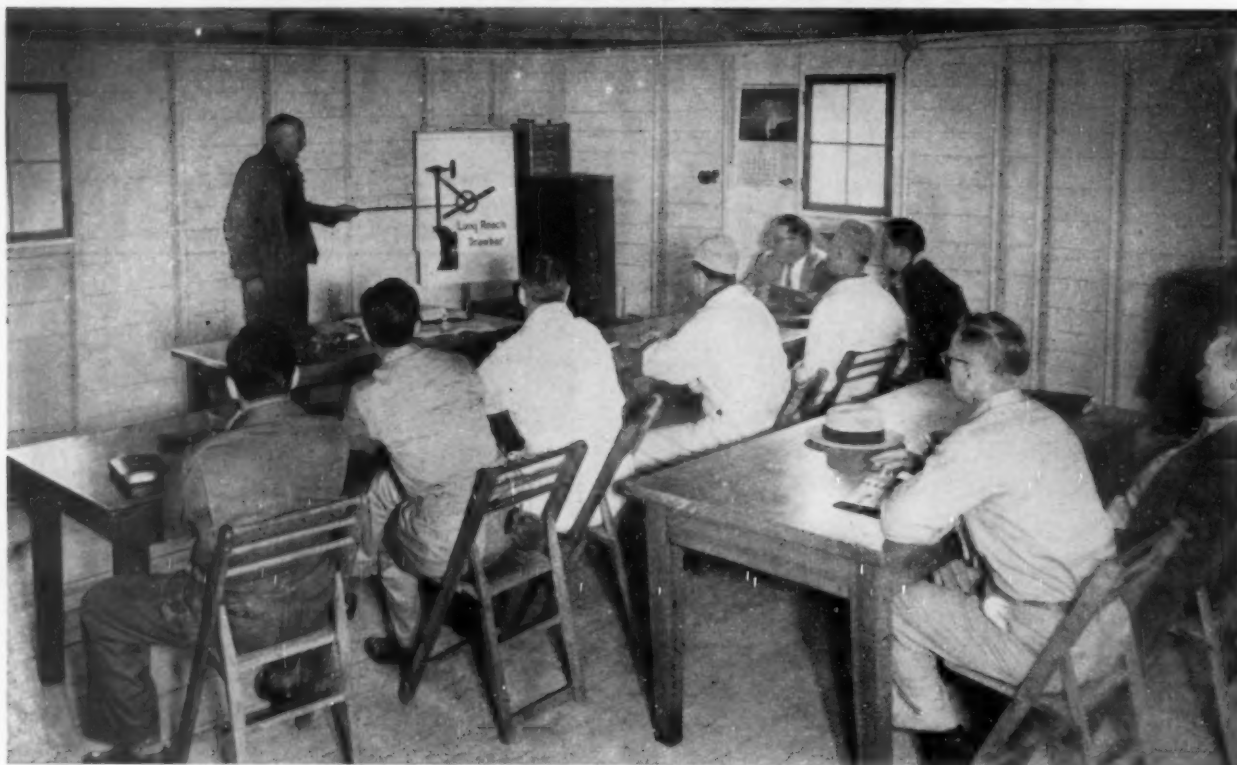
LeTourneau-Westinghouse Company, Indianapolis, Indiana

Let your local ADAMS dealer demonstrate  
the size best suited to your needs—75 to 140 H.P.

*Make your next  
motor grader an*



... for more details circle 161, page 12



**PREVENTIVE MAINTENANCE TRAINING KITS** — movies, slides, charts and literature are available to help train your personnel. Your Allis-Chalmers dealer will pre-

sent it for you at your convenience, or arrange to have a factory man do the job. And it can be tailored to suit your specific machines and job conditions.

## How contractors can take full advantage of Allis-Chalmers Dealer Service Plan to help protect profits

### **BENEFITS:**

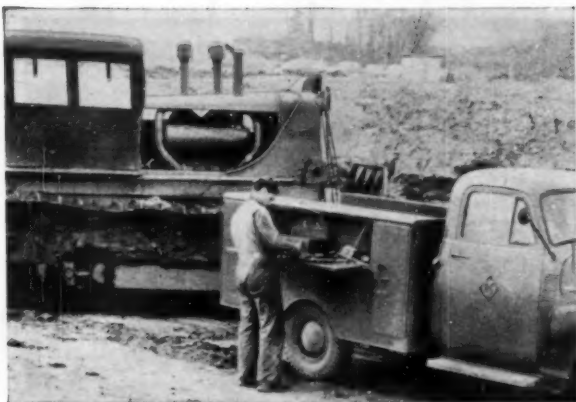
Better performance — more time on the job — longer equipment life — lower maintenance cost — higher resale value

Experience has convinced many contractors that the Allis-Chalmers Dealer Service Plan is geared to keep equipment operating efficiently. They have found that taking full advantage of such service is easy, and that it pays big dividends. Here's why.

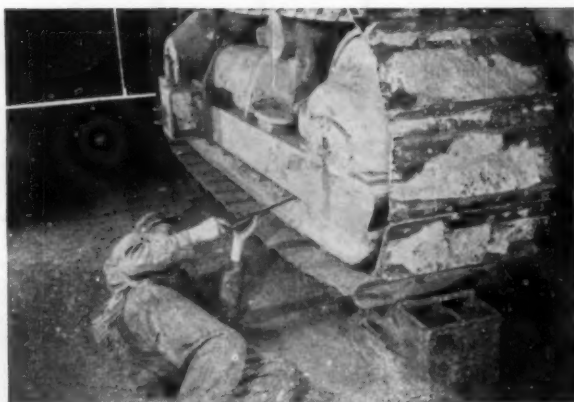
Allis-Chalmers dealers offer them a *planned* approach to service, right from the day their equipment is delivered. It covers everything from service schools to lubrication schedules, and from parts to preventive maintenance.

You owe it to yourself to take a look at the advantages this plan offers. Then see your nearby Allis-Chalmers dealer soon and ask him to give you all the facts.

**ALLIS-CHALMERS**  
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.



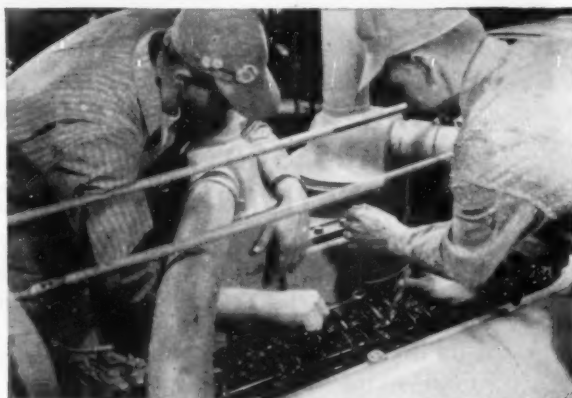
**FAST PARTS SERVICE** — Factory-built Allis-Chalmers parts are stocked in quantities by the dealer, to give you parts service as close to your job as possible. And remember, experienced equipment men agree it pays to use only standard factory-built parts.



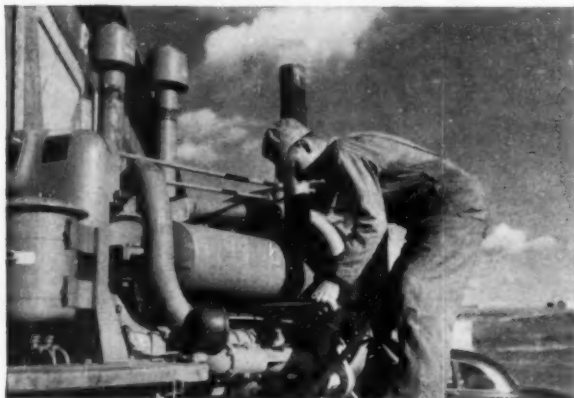
**SCHEDULED CHECKUP PROGRAM** — Your Allis-Chalmers dealer will help you plan a schedule for all maintenance to keep your equipment operating efficiently. You'll save on repair bills, avoid costly downtime, get far better performance, longer life from your machines.



**OPERATING TIPS** — Allis-Chalmers dealer servicemen are trained to give your operators all the facts they need to operate your equipment most productively. For example, one of the most important things for an operator to know — how to recognize when adjustments should be made.



**SPECIALIZED FACILITIES** at your Allis-Chalmers dealer include factory-approved tools and all necessary service equipment. Factory-approved methods are used to save you time and money, assure finest workmanship, to help you get full value for your equipment dollar.



**FACTORY-TRAINED DEALER SERVICEMEN** have the specialized experience to help you spot trouble symptoms fast, help you prevent costly breakdowns. Their training never stops; they make it a policy to stay abreast of every development so they can be of real value to you. And they're ready to go when and where they're needed.

... for more details circle 162, page 12



**FACTORY SERVICE SCHOOL TRAINING** is open to your servicemen just as it is for dealers. Training is by men who know the equipment best. Visual aids and easily understood literature are used. And your men discover that Allis-Chalmers design simplicity makes the equipment easy to learn... easiest of all to service.





## BLAW-KNOX ROAD WIDENER SPREADS 500 TONS PER DAY ON PENNSYLVANIA WIDENING JOB

This job really rolled for D. E. Smith, Inc., of Mifflin, Pa. Their contract called for widening  $\frac{3}{4}$ ths of the stretch from 18' to 22' and the balance from 20' to 24'... spreading 2" of fines in the bottom of a 3-foot wide trench and, after compaction, spreading 10" of No. 4 crushed stone on top of the fines.

*The Blaw-Knox Model 95 Road Widener sewed up this job at a schedule trimming clip... spreading 500 tons per day, or widening approximately 3200' of highway every 10 hours!*

Speedy operation is just one way Blaw-Knox Road Wideners step up profits. They also lay concrete without forms, handle asphaltic concrete, dirt, gravel, stone or any kind of aggregate. They handle any widening jobs from 2' to 10' widths. Your Blaw-Knox distributor will gladly show you the time-saving, money-making features of the Model 95 Widener. Call him today.

## BLAW-KNOX COMPANY

Blaw-Knox Equipment Division  
Pittsburgh 38, Pa.  
Offices in Principal Cities

BLAW-KNOX  
also manufactures  
a "Complete Package"  
of concrete paving  
equipment



Clamshell  
Buckets



Batching Plants



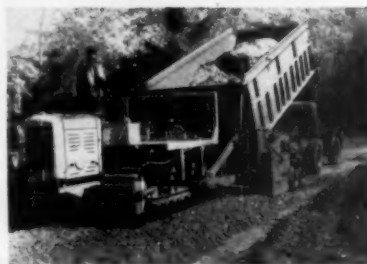
MultiFoot  
Pavers

Spreaders and  
Finishers

Road Forms

... for more details circle 167, page 12

BLAW-KNOX BASE PAVERS  
LAY 400 TONS PER HOUR  
DEPTHS TO 20 INCHES  
WIDTHS TO 16 FEET



Two models available to cut weeks off base course schedule time! Blaw-Knox Base Pavers spread stone, slag, gravel, soil cement or crusher run aggregate without segregation. Straightedge leveling reduces the need for hand dressing behind the unit for accurate results.



EQUIPMENT DIVISION



here's the backbone of the highway...

# CLINTON WELDED WIRE FABRIC

Embedded in the concrete pavement, in the base course or in the asphaltic concrete surface, Clinton Welded Wire Fabric is the steel reinforcement that literally holds the highway together. The heavy, welded wires give positive mechanical anchorage of the concrete which means better load distribution and controls cracking.

Clinton Welded Wire Fabric is available in a wide variety of gauges and spacings for all reinforcing requirements. It meets all A.S.T.M. and A.A.S.H.O. specifications.



THE COLORADO FUEL AND IRON CORPORATION, DENVER AND OAKLAND

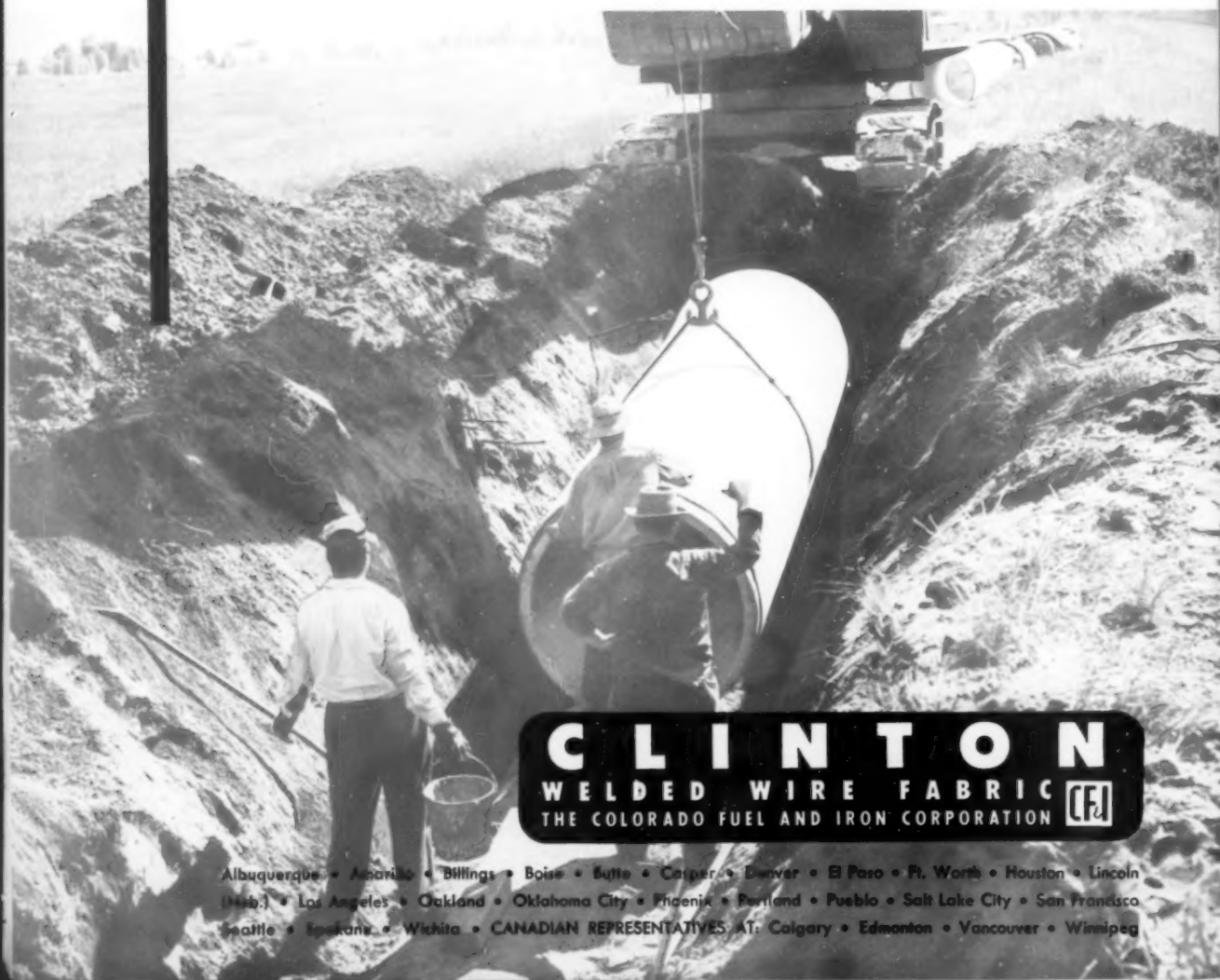
WICKWIRE SPENCER STEEL DIVISION, NEW YORK

here's the backbone of concrete pipe..

# CLINTON WELDED WIRE FABRIC

Concrete pipe reinforced with welded wire fabric has the structural strength and freedom from corrosion necessary for maintenance-free pipe systems. Whether for new construction or for repair, when you specify concrete pipe reinforced with Clinton Welded Wire Fabric, you have assurance of a well-built job and a minimum of expense in the future.

Clinton Welded Wire Fabric meets all A.S.T.M. specifications and is available in the complete range of gauges and mesh sizes.



**CLINTON**  
WELDED WIRE FABRIC   
THE COLORADO FUEL AND IRON CORPORATION

Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver • El Paso • Ft. Worth • Houston • Lincoln  
(Nebr.) • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco  
Seattle • Spokane • Wichita • CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

***Faster  
Cycle Time  
and more  
Pay Yards!***



**"EUC" SCRAPERS  
Load Easier—  
Haul Faster**

On short hauls as well as long ones—and in all types of material—"Euc" Scrapers move more pay yards per hour because they are easy loading and maintain fast cycle time. They have the power and traction needed for fast loading, high travel speed and for working on steep grades with full payload.

At McGuire Air Force Base in New Jersey, for example, six "Eucs" with 300 h.p. engines and Torqmatic



Drive and scraper times are 29.50 x 25 for traction in sandy soil.



Torqmatic Drive utilizes maximum engine h.p. at all times.

Drives average 5 trips per hour on a 3000 ft. one way haul for Tecon Corp. of Dallas, Texas. On another section of this 750,000 yd. runway grading job, the fast cycle time of the Euclid 15.5 cu. yd. Scrapers enabled them to move 265 yds. each per hour on a 2000 ft. haul.

"Euc" Scrapers have struck capacities of 7, 12, 15.5 and 18 cu. yds—have your Euclid Distributor show you how they can do more work at lower cost per yard on your present or future work.

**EUCLID DIVISION**  
GENERAL MOTORS CORPORATION  
Cleveland 17, Ohio



**Euclid Equipment**

FOR MOVING EARTH, ROCK, COAL AND ORE





Like these contractors, you can

**Bid lower- Finish jobs faster-  
make more per contract**

**SPECIFY**

**GENERAL MOTORS  
DIESEL POWER**

*In all your construction equipment*

**"Works faster... burns less fuel...  
costs less to maintain."**

That's what these contractors—operating *seven* different kinds of General Motors Diesel-powered equipment—report about their GM Diesels. They've got on-the-job proof that a GM 2-cycle Diesel does more work at less cost on every construction job.

If your business is building anything from sewers to skyscrapers, you'll find a good way to build your business is to *specify* a GM Diesel when you buy equipment.

For this quick-acting 2-cycle Diesel accelerates faster under load, burns fewer gallons of low-cost fuel, stands up better even in toughest working conditions. You won't need service often but, when you do, your GM Diesel distributor backs up engine performance with fast service and quick delivery of low-cost parts, no matter where your contracts take you.

Today you can get GM Diesel power in over 750 different models of equipment built by more than 150 different manufacturers. Get their names from your local GM Diesel distributor or write direct for the list.



**25% MORE WORK AT HALF  
THE FUEL COST**

California contractors McGuire & Hester report they're getting 25% more work—and spending 50% less for fuel—since they converted this  $\frac{3}{4}$ -yard dragline from gasoline to General Motors Diesel power. The compact "4-71" GM Diesel did such a good job that the contractor repowered two more shovels with GM Diesel.





### WORKS 1/3 FASTER—CUT FUEL COSTS 60%

Maryland contractor Charles F. Knox, Jr., reports he gets 1/3 more production, has cut fuel costs 60%, since he converted this 3/4-yard shovel from gasoline to GM Diesel power. The shovel works 8 to 10 hours a day, costs far less to maintain. You can specify GM Diesel power in over 50 shovel models built by more than 20 manufacturers.



### PAVES 1400 FEET A DAY

This Koehring Paver, powered by a compact, quick-accelerating GM 2-cycle Diesel, lays 1400 feet of 25-foot wide pavement per day for the Austin Road Company of Dallas, Texas. You can lay pavement faster and at less cost with GM Diesel power—available as original equipment in 8 paver models made by 4 different manufacturers.



### "FASTEST DITCHER IN THE AREA"

McGuire & Hester specified GM Diesel power in two new Buckeye Ditchers and a Lorain Crane, as well as repowering a Hough Payloader, after getting more work at less cost with GM Diesel power in their dragline. The master mechanic calls this GM Diesel-powered Buckeye Ditcher "fastest in the area."



### NO REPAIRS IN TWO YEARS

These GM Diesel-powered LeTourneau-Westinghouse Tournapulis worked over two years in flying abrasive dust without losing a day for repairs, reports Arizona contractor Link L. Colvin. In every kind of earth-moving equipment GM Diesel power lasts longer, works faster, costs less to run and maintain.

## DETROIT DIESEL ENGINE DIVISION

GENERAL MOTORS • DETROIT 28, MICHIGAN

Single Engines . . . 30 to 300 H.P. • Multiple Units . . . Up to 893 H.P.

. . . for more details circle 216, page 12

When writing advertisers please mention **ROADS AND STREETS**, February, 1955



Down time gives anyone the freezin' fidgets. Best way to avoid it is to insist on genuine CAT\* parts every time. That's the only way to be sure of getting parts that are made to the latest design, precisely manufactured of the right materials, rigidly inspected and tested.

#### Take track rollers, for example

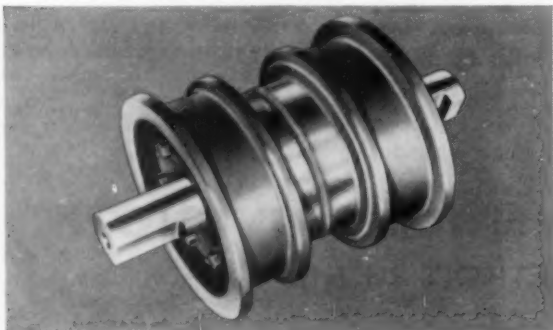
Some makes of track rollers may look alike—at first glance. But look closely at a genuine Cat roller: deep-hardened forged steel rims, center welded to prevent spreading... one-piece shaft... cast iron hub of high compressive

strength to lessen bore distortion... specially alloyed bronze bearings... shaft wearing surfaces "Hi-Electro" hardened. With a substitute roller: who can be sure?

The difference on the job: with genuine Caterpillar-built track rollers you get extra trouble-free hours of profitable production, and top performance in even the worst working conditions.

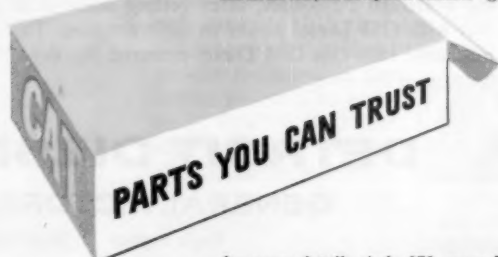
With substitute parts: who can be sure? **Better get genuine Caterpillar parts every time.**

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.



## CATERPILLAR\*

\*Both Cat and Caterpillar are registered trademarks—©



... for more details circle 172, page 12





## ROADS AND STREETS

- Mechanical spreader being used to get uniform application of calcium chloride.

# Low Cost Stage Construction With Calcium Chloride

**By Bonner S. Coffman**

Soils Engineer, District of Columbia Department of Highways

*An example of calcium chloride stabilization practice in which good specifications and job supervision pay off in quality construction.*

**F**OLLOWING World War II the District of Columbia Department of Highways faced the problem of providing all-weather roadways in residential areas which were increasing at an unprecedented rate.

This demand for new roadways was greater than could be supplied by

the department's maintenance forces. The District as a result adopted a "stage construction" plan on a contract basis for constructing low-cost roadways in newly-developed areas. Under the plan the District constructs to final grade an 8 in. thick gravel roadway which is sealed with a pene-

tration type asphalt surfacing. When later conditions warrant, a higher type surfacing will be placed.

The District awards two six-months contracts a year for constructing gravel surface on various streets. These are let on a tonnage basis and as streets are cut to subgrade the contractor may place gravel. Recent contracts have been averaging about 50,000 tons, which yields from 4 to 5 miles of surfaced roadway on street sections which average 400 ft.

The gravel roadway with surface treatment involves three separate phases: grading subgrade, placing gravel, shooting with bitumens.

- *Grading by Developers.* About 80%

- (Left): How inspectors rake down through strata to get representative pit sample. (Middle): Spreading gravel for the street base. (Right): Placing and rolling done in two lifts.





● (Left): Making final spread of washed gravel for bituminous cover. (Right): A typical finished suburban street — base strength for any traffic increase that may come along with addition of higher type surface.

of the roadways developed through stage construction are graded to the final planned subgrade elevation by the builders or developers. After utility and service lines are in, the District begins pavement construction.

Specifications require that the contractor level the subgrade with a blade grader and thoroughly roll it with a 3-wheel 10-ton roller before placing any gravel. The District maintains a construction inspector on the job to insure that the specifications are followed.

● **Constructing Gravel Surface.** The contract specifications require that granular base material shall meet all requirements for Gradings A, B or C of AASHO. Designation M 147. There are ample deposits of bank-run gravel in this area meeting requirements.

The District maintains a trained soils inspector at the gravel pit at all times while the contractor is hauling material. His procedure is to sample continuously ahead of the pit operations, to insure available tested borrow locations meeting requirements.

Blending of materials is sometimes practiced where it is practicable and the pit operator is agreeable. The natural moisture content of the bank-run gravel is usually satisfactory for good compaction. Exceptions occur when it usually becomes necessary for the inspector to recommend the water wagon to bring material to optimum moisture content.

The gravel is placed carefully in the spreading operation to prevent segregation of materials. The dumping, spreading and rolling procedures follow each other closely to prevent the material from drying out and to avoid the necessity for blending materials on the grade.

District specifications require at least 100% of standard AASHO maximum density in gravel bases. Loose-lift thickness is controlled to give a compacted thickness of 8 in. may be achieved in two lifts, without exceed-

ing a 6-in. loose-lift thickness. Occasional density tests are made in the rolled gravel to check requirements. Compaction has been readily obtained on all streets.

● **Calcium Chloride Added.** After the gravel has been compacted to the design thickness, the entire surface is spread with calcium chloride at about 2 lb. per sq. yd. The deliquescent property of calcium chloride prevents dusting and permits opening the street to traffic during its curing period before surface treatment with asphalt. Calcium chloride also maintains moisture control and aids in attaining maximum compaction under the action of traffic.

The curing period is considered very important in the District's program during which the gravel surface is exposed to the effects of traffic and climate. The specified minimum curing period is six weeks and occasionally a street may lay over the winter before receiving the asphalt surface treatment. During the curing period the maintenance forces, using materials supplied under an item in the current "Gravel Roadways" contract, repair soft spots or irregularities that may develop. This maintenance work does not constitute a great problem. It is usually occasioned either by hard, fast rains that tend to wash out gravel near the gutter line, on grades of about 5% or over, or by long soaking rains on grades of less than about 1%.

● **Surface Treatment.** At the conclusion of the curing period, or when practicable, the gravel roadway is covered with a double bituminous surface treatment. This work is done under separate contract. The District has found it more practicable to let a spring and a fall contract.

Before applying surface treatment the contractor blades the roadway and thoroughly rolls it bringing the surface to grade. If irregularities of some magnitude are encountered the

roadway is scarified to 3 in. minimum depth, the necessary material is added, and the area is thoroughly rolled. The surface is then treated with an RT 2, or when this is not available with an inverted emulsion, Type IE-1, at about 0.5 gal. per sq. yd. using a pressure distributor.

Following application of bitumen the surface is covered with washed gravel corresponding to Size No. 67, AASHO Designation M 43, at about 0.5 gal. per sq. yd. and covered with washed gravel, corresponding to Size No. 8, AASHO Designation M 43, at 25 lb. per sq. yd., and rolled. The roadway is opened to traffic.

● **Cost Data.** The cost of the completed low cost roadways has steadily decreased since they were first put on a contract basis about three years ago. The gravel contracts when first let cost \$1.60 per ton for gravel complete in place. The bid price for gravel on the current contract is \$1.37 per ton. The cost for surface treatment when first put on a contract basis was 64c per sq. yd. complete in place using limestone; the cost under the current contract is 38c per sq. yd.

The roadways in general have held up well and have required only a reasonable amount of maintenance. The District's program calls for armor coating the streets once within each three years after completion. Few streets have as yet been carried through to the last planned step, which will consist of covering the roadways with a thickness of approximately two in. hot plant-mix asphaltic concrete.

The District's stage construction is primarily designed to furnish pavements in residential areas subjected to relatively light traffic density and load. If a street at any time becomes an arterial route, or is subjected to a load-density greater than its designed capacity, it has an excellent foundation for improvement with a higher type pavement.

## Briefly Noted . . .

The latest edition of Portland Cement Association's chart of specifications for concrete pavements by state highway departments is just out. Any one who has the idea that concrete road design and construction are well standardized need only to study this document for a few moments to see that this is far from being so. Why does one state insist on a burlap drag texture while another requires transverse brooming? Why all the different methods of curing, when some methods may cost several times that of others? Why the rather bewildering variations in requirements under a score of other headings?

Some of these differences can be charged up to climatic needs. Some to interest in keeping up with progress. Some to the fact that many details are admittedly still controversial, and that there is more than one way to get a good and economical job. In other practices, such as joint sawing, the art is still young and many are looking on and waiting to see what's what.

On the subject of joints and how they should be spaced, filled and reinforced engineers can still fall into a lively debate at the drop of a hat, indicating the need for more research and more application of known and established principles.

Serving further to focus on the fact that concrete paving is still a young and lusty art, are the many divergent features of design and construction on two turnpikes involving large paving yardages during 1952. We refer to the West Virginia turnpike whose concrete paving methods were discussed in October *ROADS AND STREETS*, and the Ohio turnpike featured in November.

Perhaps the two most dramatic differences here are in the requirement

versus the prohibition of sawed transverse joints and a reverse for distributed reinforcement. Very large sums are involved in decisions of judgment here, in first costs as well as in how well the pavement will pay off under tomorrow's heavier traffic. Experience and mature judgment, as well as the slide rule, will always be necessary in making some of the decisions, but it is hoped that further research and field observation will narrow down the area of guesswork.

In West Virginia, where an 88-mile toll turnpike was recently opened to traffic, the County Sheriff at Beckley is putting the Turnpike Commission to a court test.

It seems that he will offer 65 parcels of land comprising the toll road right-of-way for sale at public auction as tax delinquent land. The Sheriff's purpose, it is said, is to bring about a court test of the extent to which the Commission is a state agency as opposed to being a private corporation. "The Commission should be either fish or fowl, not both," he said.

What with the injunctions sought against the toll road program in Illinois, and similar action in other states, it would seem that we are in the midst of a very necessary period of legal clarification. Before new toll roads are begun, they should be properly established by law and their set-ups should be put to every conceivable court test in advance of construction.

Several batches of toll road project offerings have attracted bids ranging from 20 to 40% below engineers' estimates recently. For example, bid-

ders, 13 in number, filed bids on a segment of the New York Thruway system. Low bid was \$5,057,208 compared with \$6,485,000 estimated. Other bidders were not much higher.

Similar stiff competition is to be noted in other states on very large turnpike projects. How much of this spirited bidding is due to competition among the big fellows, and how much to the inherent economy and efficiency of large contracts in the \$5 million to \$10 million class?

Also, how much of the discrepancy is due to a lack of estimating realism or skill. Not many engineering estimators really know their costs on the large, complicated urban projects.

One of the observations in the ARBA Task Force report on the contracting industry's ability to handle the big proposed highway program, is the greater efficiency of the bigger projects made possible by opportunities for better utilization of equipment, wider spread of overhead, etc.

Safety campaigns to reduce highway job accidents pay off in cold dollars and cents in addition to saving lives.

A conspicuous example is the drastically lowered insurance premium rate enjoyed by the Pennsylvania Department of Highways for its employees. Net insurance premiums have dropped from \$402,000 in 1944 to \$191,000 in 1954 — a record low — despite an increase in compensation grants and a three-fold growth in allowance for doctor and hospital bills. This saving is considered to be the direct result of the department's continuing safety program.

**IT COSTS LESS TO BUILD GOOD ROADS THAN TO HAVE POOR ROADS**



# Roads and Streets in the News

## \$101 Billion Road Program Gets Clay Committee OK

THE long-heralded Clay Committee Report landed on President Eisenhower's desk last month, endorsing without qualification his bold proposal that highway construction be doubled in volume over the next 10 years to meet the needs of an expanding economy.

The committee, which was asked by the President six months ago to explore the feasibility of a \$101-billion roadbuilding program, backed Mr. Eisenhower's hand with strong recommendations for an unprecedented federal assistance program.

Road construction continued at the current rate would total \$47 billion between 1955 and 1965. Yet, the nation's total highway needs are more than \$101 billion, the Bureau of Public Roads claims. The Clay Committee's assignment was to determine how the remaining \$54 billion could be provided to meet highway and

street needs for the traffic of 1965.

Last month, after hearing advice from almost every segment of the highway industry and from public officials, the five-man group, headed by General Lucious Clay, told the President:

- That the federal government should sink \$25 billion into the 10-year program as its share of the needed \$54 billion, as well as continuing its traditional federal aid appropriations. The latter would amount to about \$6.2 billion over the 10-year period, under the committee's plan, bringing total federal participation in the \$101-billion program to \$31.2 billion.

- That the remaining \$29 billion of the needed \$54 billion would have to come from the states and cities. This would necessitate a 74% boost over their current expenditures for road construction. The committee offered

no suggestion for raising this money, except to encourage toll financing.

- That the \$25 billion in new federal funds should be applied to construction of the National Interstate System and connecting arterial routes in urban areas. This 40,000-mile prime route network connects the nation's largest cities, seaports and industrial centers. It has become the priority objective of the federal planners, and military and civil defense officials, who see it as the economic highway transportation lifeline and strategic defense road system. Needs on the interstate system are estimated to be \$23 billion. Another \$4 billion would be needed to construct urban arterial connections and interchanges. General Clay has proposed that the federal government assume nearly full financial responsibility for the interstate network and that the states contribute only what is required of them in matching funds under the 1954 Highway Act. Both cities and states would be asked to share costs of the \$4-billion worth of arterial connections.

- That the traditional federal aid program be frozen for 10 years, much on the current basis — \$315 billion annually for primary system roads, \$210 million for secondary roads, \$75 million for urban extensions of these two systems into cities not on the National Interstate System, and \$22.5 million for forest highways. The total — \$622.5 million annually.

### Proposed: A Federal Highway Corporation

The Clay Committee, among its recommendations for a \$101-billion roadbuilding program between now and 1965, urged that a Federal Highway Corporation be created, as an independent body, responsible directly to the President.

A three-man Board of Directors would head the organization, with the Secretaries of Commerce and the Treasury as ex officio members. The Department of Defense would also have a say in location of interstate system routes. Executive Director of the Corporation would be the Commissioner of the Bureau of Public Roads. Other staff personnel would be drawn from the Bureau of Public Roads and the Treasury Department.

This corporation would finance construction of the National Interstate System, issuing bonds and utilizing the proceeds therefrom for the following purposes:

- To pay the states for constructing projects on the interstate system or arterial connecting routes in urban areas.
- To credit a state for funds expended in building sections of the interstate system, toll or non-toll, that come up to prescribed design standards for that network.
- To pay the necessary costs of administration, planning, and research.
- To establish an advance revolving fund, if requested by any state highway department, to enable it to prosecute the program pending receipt of any payments described above.

Bond issues made by the Corporation would be made under close direction by the Treasury Department.

### Urges Federal Corporation

The Clay Committee urged that a Federal Corporation be created to finance the needed interstate system construction. The proposed FHC would be authorized to issue 30-year bonds which could be retired from federal gasoline tax revenues. This would be the sole source of the \$25 billion in additional federal aid. Regular federal aid, as described above, would continue to come by Congressional appropriation.

States should be reimbursed for toll projects built on the National Interstate System, the committee said, and permission given for diversion of the federal interstate funds in those instances to projects on other federal aid routes within the state. Toll road construction "should not be discouraged," the committee report declared, and "... sound toll projects which fit into the system are worthy of consideration by the states."

This proposition is already shaping up as the most controversial of the committee's recommendations. Highway user organizations, including bus operators, truckers, and motorists, see this as an attempt to spread toll financing wherever feasible and are registering powerful opposition.

The report indicated that 5,242 miles of toll roads are now in operation, under construction, financed or authorized in 23 states and that additional proposals in these and five more states bring the total of present and potential toll routes coinciding with the National Interstate System to 8,527 miles.

General Clay noted that cost of the recommended 10-year program of construction could be met by anticipated increases in the federal gasoline tax revenue without boosting the present 2c rate. "Thus, the program creates no demand for further taxation for its accomplishment," he said.

The engineering, administrative and legal implications of a doubled road-building output were also explored by the committee. General Clay declared: "Probably the most serious initial obstacle to execution of this program is a shortage of highway engineers and technical personnel." He urged full utilization of private engineers and simplified procedures, as well as standardization of specifications to increase productivity and planning. An enlarged highway research endeavor was advocated.

In the area of state highway legislation, the committee stressed, statutes must be modernized to make possible the advance acquisition of right of way and control of access necessary to maintain standards for superhighway construction. Inadequate state laws in regard to right-of-way purchasing powers could be "serious obstacles," the report noted, and the lack of laws to control access in some states could nullify design objectives. In blunt language, the committee asserted that the failure of a state to develop needed legislative tools could "seriously delay and jeopardize" its opportunity to receive the very substantial federal aid proposed for interstate projects.

The five-man group justified its many recommendations for unprecedented federal assistance and leadership by pointing to an expanding, vibrant business growth, more dependent than ever upon highway transportation. "An increase in federal expenditures of approximately \$25 billion for highway improvement over the next 10 years is of vital importance to our growth as a nation..." the committee said.



● Setting 208-ft., 167-ton girder for new bridge at Buffalo.

### Near-record girders set for Buffalo highline

The Buffalo Ship Canal recently was bridged by steel for the \$12,000,000 High Level Bridge when two 208-ft. suspended girders were lifted from a barge and placed in position 120 ft. above the water.

With work beginning at daybreak, 167-ton girders were lifted into place by derricks. The derrick-travelers, one on each bank, were each of 115-ton capacity. The travelers were over the piers atop the superstructure.

The girders were fabricated at the Rankin, Pennsylvania, works of Bethlehem Steel Company, the erection contractor, and shipped by rail in three sections.

Once the girders were hoisted into the proper position, they were connected at each end by a steel pin 13 in. in diameter to a 70-ft. cantilever arm protruding from the superstructure. Due to the extreme length of the girders, two erection frames, one at each end, steadied the girders 30 ft. from the pins until tons of floor beams, stringers and bracing could be erected.

The big girders, 12½ ft. deep, have a large broadside area offering considerable wind resistance, and Beth-

lehem engineers had announced the erection would not be attempted in any wind exceeding 18 mph.

In the superstructure the girders are set 40 ft. apart, center to center. The travelers lifting them were equipped with 115-ft. booms and 53 ft. masts.

Prime contractor is Bates and Rogers Construction Corporation, of Chicago. The steelwork is being fabricated and erected by Bethlehem's Pittsburgh Erection District.

### \$88 million Chicago Skyway project approved

The Calumet Skyway toll project on Chicago's south side was brought a step nearer realization during December by passage of a city ordinance. Revenue bonds of \$88 million were authorized to be sold for this elevated structure, 6 lanes wide and about 7 miles long. It will carry traffic between downtown Chicago and the state line near Gary. The need for the road was precipitated by the location of the Indiana toll road, which will dump traffic into Chicago's southern outskirts. Traffic on the bridge is predicted at 14 million vehicles the first year and 27 million vehicles later.

# Planning and Design Problems for a \$101 Billion Road Program

*As reported by Task Force No. 1 on Planning and Design. Hal G. Sours, Consulting Engineer, Columbus, Ohio (Chairman); J. N. Robertson, Director, District of Columbia, Department of Highways; Ben H. Petty, Professor of Highway Engineering, Purdue University; Warren A. Coolidge, Director of Public Works (Nashville); Otto S. Hess, Engineer Manager, Kent County (Mich.) Road Commission; Charles M. Noble, Chief Engineer, New Jersey Turnpike Authority; Rex M. Whitton, Chief Engineer, Missouri State Highway Department.*

**T**HE \$101 billion in highway deficiencies reflect the following requirements.

(1) Placing the National System of Interstate Highways in condition by the end of 1964, when all mileage then in service will be structurally adequate and will meet geometric design standards for 1974 traffic conditions.

(2) Placing all other systems of highways in a structurally and functionally adequate condition for 1964 traffic.

The deficiencies may be classified into three broad categories, as shown in Table 1.

Many miles of secondary and local roads in the \$10,000-per-mile class will involve few engineering problems. Streamlined aerial photogrammetric surveys and abbreviated plans will often suffice for these.

Engineering problems will center on urban expressways, local city streets and primary rural roads which account for 69% of the deficiencies. After deducting for rights-of-way, clearance and demolition, the remaining cost of correcting the deficiencies on the primary rural and urban highways and the local city streets is about \$60 billion. It is with this expenditure, about \$6.0 billion a year, that major engineering problems may be associated. The \$6.0 billion rate is about 140% more than the comparable \$2.5 billion figure for 1954 construction.

Today's 58 million registered vehicles are expected to grow to at least 80 million in the next 20 years, and traffic (presently 500 billion vehicle-miles per year) increase 30 billion vehicle-miles each year. The need is for planning and designing for the future as well as the present.

*Reports of Task Forces 2, 3 and 4 on materials, contractor capacity, and the equipment problem were reviewed in January ROADS AND STREETS.*

• **Backlog of Plans.** In 1954 the highway departments had plans ready or partly ready for almost \$6 billion in construction. Toll authorities have another \$10 billion under construction or in development, chiefly under consulting firms.

Also, cities and counties, which normally do about \$1 billion in road and street construction in a year, have at least a year's plans on the shelf. This and other work, such as widening and resurfacing, needing little or no planning, could be started promptly.

The value of highway work for which plans are wholly or partially complete is, therefore, over \$16 billion.

• **Lead Time Requirements.** The lead time for main traffic expressways is extensive. One report estimates 54 months' elapsed time for planning, authorization, design, and construction of a \$180 million, 298-mile toll road. Assuming 2 years for construction, the lead time is 30 months. For another toll road it is 18 months. Federal-aid work recently has averaged 21 months from fund authorization to dirt-flying.

Clearly hence we must get to work at once building up a backlog of plans, particularly for the interstate system. Advance planning on a large scale should be initiated now, and ways found to cut the lead time.

• **Professional Engineers.** The highway departments use in planning, design, and supervision from 3 to 18 professional engineers per million dol-

lars of construction work. The average is about 8 — a wide range; some states can surely greatly step up productivity per engineer. About one-fourth of the departments report they can operate at or below this ratio when the program level reaches \$10 billion per year. Through close supervision and organizational streamlining, such a reduction in professional engineer requirements should not be too difficult.

Some of the things possible or likely:

1. Experienced engineers, often still in sub-professional positions, should be given greater responsibilities.

2. Greater use can be made of standard plans and specifications, and plans simplified.

3. Additional engineering capacity may become available from declining construction fields. Industrial, railroad and conservation and development construction is expected to be \$765 million lower in 1955 than in 1954; here are engineers for at least \$1 billion of highway construction.

4. Greater use should be made of county and municipal engineering staffs.

5. Schools could supply more graduate engineers if the future in highways is sufficiently attractive. Of the 20,000 engineer graduates available to industry in 1954, 20% were civil engineers. To attract as many as 2,000 per year or 50 percent of the civil graduate to highways, a real task in itself, could be accomplished only by establishing a better long-range salary and security outlook and offer-

**Table 1**

	% of Total Deficiencies	% of Total Mileage	% of Total Traffic
Urban Expressways and Local City Streets	36)		75
Primary Rural Roads	33)	17	
Secondary and Other Local Rural Roads	31	83	25
	100%	100%	100%



ing a chance to get good experience and professional recognition.

6. Many large time-consuming projects involving complicated design features lie ahead. Competent consultants are available to augment public agency forces in preparation of plans.

7. The Bureau of Public Roads, with little if any increase in personnel, is fully capable of coordinating, directing and supervising the Federal interests in the proposed program.

• **Sub-Professional Employees.** It is in the highway sub-professional group — now numbering about 90,000 — that the major expansion of engineering personnel will be necessary. A definite shortage looms. At the present time, three or four sub-professional employees are being used for each professional employee.

Full use of modern survey methods and standardization of plans are prerequisites to economy in personnel. For example —

(a) Location and cross-section surveys can be performed more extensively by aerial photogrammetry.

(b) More overpass structures can be built from standardized designs and plan sheets. Standard prefabricated bridges can also be utilized on the many small stream crossings.

(c) Larger contract size will often require less engineering detail and sub-professional work per dollar. There will be many smaller contract jobs of course.

Enough sub-professional employees may move in from other fields to handle an extra billion a year in road work. The remainder needed would require the recruitment and training of capable applicants. This means wage scales comparable with competing industry; and both theoretical and practical on-the-job training in drafting and surveying.

• **System Location.** A speedy start on the program requires that we first plan the detailed location of an integrated highway system on which to proceed with orderly improvements. Location problems will center chiefly on the interstate system. These highways are now conceived as broad freeways for swift, uninterrupted flow of traffic, with no entering or cross streets except at interchanges; and having full control of access obtained either by legislative authority or by frontage roads. Many state highway departments and smaller cities have not yet decided whether to allow these transcontinental expressways to pass through the city, or to build them as belt routes with connecting radial routes. Because of the impact on the business districts from these

wide expressways, their location requires time-consuming, precedent-making decisions. Because of the complexities, city and other agencies need rapidly to devise master highway programs with priority schedules.

While the problem is greatest on the urban interstate links, it is also of consequence on the rural links and some portions of the Federal-aid urban system. Because of the geometric standards required, much time and effort are needed to locate the shortest and most economical route. There should therefore, be an intense and concerted effort by all parties concerned.

• **Access Limitation.** Controlled access is not generally a "must" on our established free highway systems. In contrast, access-control will be a requirement in accordance with standards recently adopted for the interstate system.

Without access control, roadside businesses spring up, reducing highway capacity and increasing the accident hazard. Congestion develops and attempts to correct the highway deficiency by widening are prevented by high roadside values. Obsolescence creeps in and authorities ultimately are forced to relocate the highway at great cost.

Acquiring of access control may be a serious bottleneck, on the interstate system, where the program would be concentrated, since many states do not have the legislative authority to take property for such control. At the present time, 13 states have no access control law at all and only 6 have a law that provides all 11 of the features considered necessary to provide the effective control needed on a modern highway system.

State agencies must take prompt action to remedy this deficiency. The public must be made aware of the value of access control laws and of the safety and economic consequences of building a system of major highways without the protection of access control.

• **Land Width and Control.** In a program which looks 10 to 20 years ahead, rapid obsolescence must be expected, and allowed, for where access control is not contemplated to preserve traffic capacity. The landstrips should be wide enough for future widening or frontage roads. Wide rights-of-way mean less interference and less development of the abutting property.

Some state laws do not provide authority for acquisition of abutting property or easements for future widening of the highway. Since right-of-way for the \$101 billion program

will cost about \$12 billion, it is worthwhile to re-examine existing laws. Better legal tools and advance planning for early land acquisition would get jobs going more quickly!

• **Grade Separations.** About 300,000 bridges must be built under the 10-year program. Particularly on the interstate system, grade separations will be numerous. Use of standard plans and of prefabrication will help in getting these structures designed. On larger steel structures, the lead time in preparing design and shop drawings may be cut down through closer coordination between industry and engineering. Understanding of steel mill practices and rolling schedules would also be helpful.

• **Load Design and Vehicle Characteristics.** There is need to determine, with some certainty, the character of the traffic our roads will carry in the next 10 to 20 years, to avoid obsolescence.

The AASHO recently authorized overhauling of its 9-year-old standards. Action on these new criteria and a prompt construction start are impeded by the lack of a definite determination of the weights and sizes of trucks for which our principal highways should be designed. Roadbed thicknesses, width and grade, and other characteristics, hinge on the allowed vehicle weight. Bear in mind that America's truck fleet has doubled since 1940; ten million trucks now travel annually 100 billion miles and will soon double again.

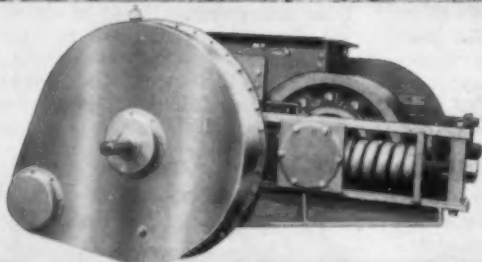
## **E. E. Howard award established by ASCE**

The American Society of Civil Engineers has announced the establishment of the Ernest E. Howard Award in honor of a late past-president. Mr. Howard, senior partner of the Kansas City, Mo., and New York firm of Howard, Needles, Tammen & Bergendoff, consulting engineers, died in 1953. The award has been made possible by funds donated by his widow.

The award, details of which will be developed, will be made annually "to recognize a civil engineer who has made a definite contribution to the advancement of structural engineering through either writing or performance."

The award which will include a gold medal will apply to work in research, planning, design or construction, including methods and materials; these contributions being made either in the form of papers or other written presentation, or through notable performance or specific actions which have served to advance structural engineering.

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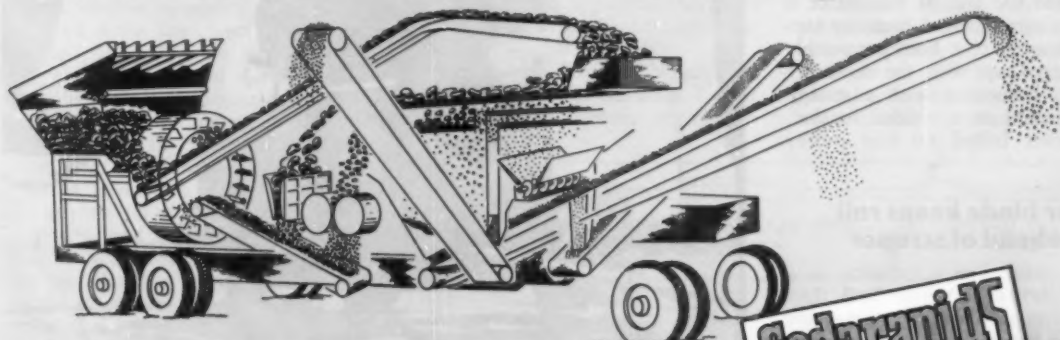
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... for more details circle 221, page 12

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## Job and Equipment Ideas



● Special device for feeding Darex into the mix.

### Contractor devises own air entraining dispenser

Contractors are still experimenting with devices for feeding air entraining materials into the drum on concrete paving work. Engineers agree that an important and often unsolved part of the job procedure is to see that the additive is supplied at a uniform, positive rate, adjustable to meet requirements.

An example of a contractor-built device is pictured here. V. N. Holderman & Sons, Inc., contractors of Columbus, Ohio, on the Ohio turnpike in 1954 used this device for feeding Darex into the mix. It consists of a hydraulic ram salvaged from the top-lift mechanism of a Ford convertible auto, rigged up with the necessary levers in connection with a storage tank mounted on a welded bracket, the bracket bolted on the paver frame.

### Rubber blade keeps rail clean ahead of scraper

Here pictured is a variation in a type of device seen now and then on concrete paving jobs. It consists of a knife-like rubber blade, designed to keep the form rail clean immedi-



● Rubber blade cleans form rail ahead of spreader wheel.

ately ahead of the wheel of the concrete spreader. Contractor: V. N. Holderman & Sons, Columbus, Ohio. Job: Ohio turnpike, 1954 summer.

### Back-up alarms for end-dumps

Euclid has perfected a needed alarm system that gives audible warning of either an air horn or gong ringing or a visual warning in the form of



● Oil-fired trailer-mounted boiler supplied steam to the pile driver.

● Usual pile driving problem under bridge deck solved by driving H-piles in short sections.



a backup light for backing vehicles. The alarm system functions only when the engine is running and the transmission in reverse, so there are no false warnings. They can be installed in the field.

### Special pile rig for low headroom

At a job of rebuilding the clover-leaf approaches at the Oakland Approach to the San Francisco-Oakland Bay Bridge, LeBoeuf & Daugherty, subcontractors to MacDonald Young & Nelson, prime contractors, were faced with the problem of driving clusters of 60-ft. steel piles under existing roadway ramps with extremely limited headroom.

To meet the situation, a special boom was fitted to a Manitowoc Model 3500 crane as shown. Next the rig was fitted with a Vulcan Super 5000 hammer and steam was supplied by a trailer-mounted boiler. The piles consisting of 53-lb. steel H-beams were then driven in 10-ft. lengths, each length being welded successively to the previous length as it was driven home until the desired depth was obtained. The piles were driven in clusters of four 53-lb. Steel "H" beam was used.

# New Procedure for Preparing CURRENT AND FINAL ESTIMATES

*Payments to contractors are expedited by use of new estimate forms, fixing of responsibility and clarification of office procedure.*

**By C. H. Buckius**

Chief Engineer, Pennsylvania  
Department of Highways, Harrisburg

**P**REPARATION and processing of current and final estimates on highway contracts has been simplified by a new procedure recently established and adopted by the Pennsylvania Department of Highways.

By the use of new estimate forms and by specific delegation of responsibilities, the procedure, herewith described, has proven to be of considerable advantage in expediting payments to contractors. It has reduced the work formerly required and has enabled quicker and more accurate checking of contract item quantities.

## Field Office Records

A field office engineer is assigned to all sizeable construction contracts to work under the direct supervision of the project engineer in charge of the job. His principal duties are to keep records and assemble all data necessary for the payment of final quantities of all contract items, except those noted otherwise.

Each field office is furnished with a complete set of plans, including all standards and shop drawings. The field office engineer is responsible for recording on them any revisions in the construction done in the field. Since these notations will become a part of the final records, accuracy rather than elaborate lettering or design is stressed and required. Such plan notations are made with colored pencils and, wherever possible, on a set of white prints instead of blue.

As the work progresses, the field office man lists in his estimate book which quantities are paid, the estimate number, and the up-to-date cumulative total paid for each item.

Mr. Buckius since writing this article has retired after a career with the Pennsylvania department dating back to 1907. He is joining Lehman Brothers, investment bankers, of New York City, as an engineering representative.

No payment is made on an item if the plan quantity is exceeded, unless a work order has been approved for the additional work. Quantities paid on a work order are so indicated in the field estimate book.

The make-up of the field office's plan and estimate book is as follows to simplify the recording work and standardize its arrangement.

**Title Sheet.** The title sheet has space for general job information, such as the list of equipment; source of materials with reference to the books containing their cost; names of the inspectors on the contract; construction data; pertinent job dates; and the date and person making the final inspection.

**Typical Section Sheet.** The typical section sheet usually includes the column for general notes. Few changes are made here, although any exceptions taken to any part of the plans or specifications are listed under the notes.

**Plan Sheets.** The plan sheets contain the bulk of the entries and great care is taken in showing any change



C. H. Buckius

in construction location. Dates and reference to field books and correspondence are accurately recorded to serve as a valuable index throughout the construction period and also to pin-point discrepancies that may occur later.

**Standard Sheets.** Any change in the standards are noted and if sketches are required, conventional drafting methods are used. Sketches are made for miscellaneous structures, but are not necessary for standard endwalls.

ESTIMATE SHEET		County	Appl. Route	Sec.		
Item No. 2	Item Class 1 Excav. - Roadway			Unit Price		
Plan Quantity 12,695	Unit C.Y.	Form 442-A & or -		Revised Quantity		
Date	Station to Station	Plan Quantity	Est. No. 1 Estimate Quantity	Est. No. 2 Estimate Quantity	Est. No. 3 Estimate Quantity	Est. No. 4 Estimate Quantity
	300+00 - 310+00	2,438	1,219	1,219		
	310+00 - 320+00	678		407	271	
	320+00 - 330+00	80			100	80
	330+00 - 340+00	891			100	891
	340+00 - 350+00	1,167		467	700	
	350+00 - 360+00	5,897	1,769	1,769	1,769	590
	360+00 - 370+00	654		654		
	370+00 - 380+00	890			445	445
Total Plan						
Subtotals			2,988	4,516	4,156	1,035
Total Paid to Date				2,988	7,504	11,660
				7,504	11,660	12,695
Final Quantity from Form 412						
Roadway Excav. = 12310						
The Following Class 1 Excav. Sheets Illustrate How Record of Current Estimates is Kept on Current Estimate Form						

• Form 414-G.

ESTIMATE SHEET										County	Appl. Route	Sec.
Item No. 2		Item Class 1 Excav.						Unit Price				
		Description				Channel						
Plan Quantity Unit		Form 442-A + or -				Revised Quantity						
3658 C.Y.												
Date	Station	lt. or Rt.	Plan Quantity	Cur. Est. No.	Estimated Quantity	Final Quantity	2nd ck.	Reason for Difference	Bk. or Sk. No.	Page		
	335-00		3,658	2	915			Estimated Quantity -25%				
				3	915			25%				
				4	1,828			50%				
	Total		Plan 3,658		4,869		✓	Form 412				
Note to Final Computer - The final I-sections will show more excavation than plan quantity. This should be allowed because the contractor was ordered to take out material up stream on left side which was outside channel slope lines. This material would have washed into channel in high water. Project Engineer												

FORM 414-H

ESTIMATE SHEET										County	Appl. Route	Sec.
Item No. 2		Item Class 1 Excav. Miscellaneous						Unit Price				
Plan Quantity Unit		Form 442-A + or -				Revised Quantity						
298 C.Y.		W.O. 24450				748						
Date	Sta. to Sta.	Description	Plan Quantity	Cur. Est. No.	Actual Quantity	Checked Final Quan.	2nd Ck.	Reason for Difference	Bk. or Sk. No.	Page		
	310+20 - 312+90	Remove Old Mac. Lt.	141	4	135	135	✓		1	21		
	330+10 - 331+80	Widen Cut Lt.	17	3	15	15	✓		1	27		
	335+10 - 336+40	Side-Walk Rt.	40	4	38*	35	✓	*Error in Computing	1	22		
	337+50 - 338+40	Outer Exc. Lt.	25	4	29	29	✓		1	24		
	368+10	Remove Old Kiln Rt.	75	2	75	75	✓		1	25		
	Total Plan Miscellaneous		298									
	350+10	Daylighting	W.O. 2									
		At Approach	450	3	450*	498	✓	*Estimated Quantity F412				
	Total Plan & W.O. Misc.		748									
	Total				742	787	✓					

FORM 414-I

FORM 414-K

ESTIMATE SHEET										County	Appl. Route	Sec.
Item No. 70		Item 6" Pipe Underdrain						Unit Price \$1.40				
Item No. 72		Item 6" Pipe Underdrain Outlets						Unit Price \$1.30				
Plan Quantity Unit		Form 442-A + or -				Revised Quantity						
Date	Sta. to Sta.	Plan or Rt.	Plan Quantity	Underdrain	Outlets	Placed Sta. to Sta.	Placed Underdrain	Outlets	Cur. Est. No.	Re- mark	Page	

ESTIMATE SHEET										County	Appl. Route	Sec.
Item No. 1		Item Clearing and Grubbing						Lump Sum Price \$1000.00				
		Form 442-A + or -				Revised Quantity						
Date	Station to Station	% Comp.	Quantity & Subtotal	Total	Cur. Est. No.	Approval						
		10	100.00		1	J.D.						
		25	250.00	35% = 350.00	2	J.D.						
		50	500.00	85% = 850.00	3	J.D.						
This form for all Lump Sum Items.												

FORM 414-L

All drainage facilities are located and sketched showing the limiting stations, sectional views and dimensions for extra depth underdrain, laterals, outlets, pipe removals, etc., as well as the dimensions for excavation of pipes and endwalls. Inlets and other structures paid at contract unit prices usually are not dimensioned.

The various drainage items are shown on the plan and standard sheets as built in the field. In the notes appear the reasons for any changes and the date and the authority for making them; the amounts of quantities as determined in the field and the current estimate number on which paid; and references to special sketches and books where accurate measurements and computations may be found.

### Field Estimate Book

The field inspectors keep an esti-

Columns 1, 2, and 3: To be filled in by District office before book is sent to field.

Column 4: To be used as record of current estimate number in which work was included.

Column 5: To be filled in with quantity as computed in field.

Column 6: To be filled in by final estimate computer in Drafting Room in place of one set of Form 484-Summaries.

Column 7: To be checked by second final estimate computer in place of second set of Form 484-Summaries.

Column 8: Project Engineer shall fill in reason for difference between plan Quantity and Actual Quantity so that information is available to complete final work order in district office.

mate book consisting of a set of new, revised forms (414 series) as illustrated, which become a part of the final records. Noteworthy is the fact that before the field estimate book is sent to the field, the district office fills in the columns containing the station, description, and plan quantity. All the contract items are listed on these forms as well as the record of current estimates paid and the final quantity amounts as determined in the field by the inspectors. The reasons for any differences between plan and final quantities are required to be shown in the book unless already stated in other field books, in which case only a reference to the source is required.

The job diary is not infringed upon in any way, but, instead, is kept more detailed to substantiate all construction details and data. Much stress is given to the importance of keeping accurate, complete, and up-to-date records in the field to provide the district office final department with reliable information.



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The assistant construction engineer must verify the quantities in the inspector's field estimate book by signature of his initials in the column headed "Approval," or after the subtotal for each item on each current estimate record sheet. Final quantities as determined in the field must also be verified by the assistant construction engineer.

Whenever an item is completed in the field, the inspector shows in the estimate book the amount paid to date on current estimates, and also the final field quantity determined by the inspectors and checked by the assistant engineer. All quantities thus determined, except roadway earthwork quantities, can then be verified for measurements or computations by the contractor's representative. Any discrepancies are adjusted prior to

forwarding of records to the district office.

The nature of a few items is such that their record of current estimates

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- Easier verification and quicker adjustment of variances in measurements and computations.
- Simplified and straight-forward methods for measurement and payment on bridge work.
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can be kept more easily on separate forms. Lump sum items are of this nature. A "% Completed" column is used in keeping the record of current estimates for such items. This form is illustrated as Form 414-L.

Class 1 roadway excavation is listed on a separate form as indicated on Form 414-G. Since roadway excavation covers numerous current estimates, the need for a column for each current estimate is obvious. The column is divided into "% completed and quantity." Subtotals are shown for each current estimate and also a cumulative total paid to date.

Measurements of underdrains and underdrain outlets are kept on the same sheet for keeping records more easily and for saving time for the final computer in checking outlets with underdrains. Columns for both "Plan Station to Station" and "Actual Station to Station" are included since the actual stations usually vary somewhat from the plan stations. Since the reasons for differences between plan and actual quantities are usually obvious, the word "Remarks" has been added to the column. The column for "Checked Final Quantity" has been omitted since differences from field quantities are rare. This form is illustrated as Form 414-K. It is also used for foundation underdrain and outlets.

The relationship between guard fence and end anchorage is the same as between underdrain and outlets and, therefore, except for wording, the same form is used.

Basis for computing and paying on final estimates are summarized in two lists. One list tabulates the payment items and designates for each item the particular forms to be used for summary and current estimate as well as whether a form, sketch or field book shall be used for computation. The other list sets forth for each item the particular unit for payment, such as lump sum, each, hundredths, tenths, half, whole, or per

ESTIMATE SHEET					
County		Appl. Route		Sec.	
<b>CURRENT ESTIMATE RECORD</b>					
Item No. 2	Item Class 1 Excav.			Unit Price	
Plan Quantity	Unit	Form 442-A + or -		Revised Quantity	
17,869	C.Y.	W.O. 2	+450	18,319	
Date	Description	Cur. Est. No.	Quantity and Subtotal	Total to date	Approval
	Roadway	1	2,988 ✓		
	Approaches	1	594 ✓		
		1	3,582 ✓	3,582	J.D.
	Roadway		4,516 ✓		
	Approaches		511 ✓		
	Channel		915 ✓		
	Miscellaneous		75 ✓		
		2	6,017 ✓	9,599	J.D.
	Roadway		4,156 ✓		
	Approaches		151 ✓		
	Channel		915 ✓		
	Miscellaneous		465 ✓		
		3	5,687 ✓	15,286	J.D.
	Roadway		1,035 ✓		
	Approaches		--		
	Channel		1,828 ✓		
	Miscellaneous		202 ✓		
		4	3,065 ✓	18,351	J.D.
<b>FINAL ESTIMATE</b>					
	Roadway		12,310 ✓		
	Approaches		1,298 ✓		
	Channel		4,896 ✓		
	Miscellaneous		787		
Final Estimate Class 1 Excav. Pay			19,291 C.Y.	REAR	6/14/53
				CHDH	5/18/53

• Form 414-J.

set, and the degree of accuracy for the computation of each.

All new construction projects are staked out by a survey corps using horizontal measurements. Offset stakes are placed for all stations and +50's, including P.C.'s, P.T.'s, P.O.T.'s, P.O.C.'s and P.I.'s. As provided in the Pennsylvania Specifications (Section 1.5.3), the contractor is held responsible for the preservation of all stakes, marks and points as may be necessary for control and guidance of his construction operations.

After the pavement is laid, the inspectors reproduce the construction survey center line in its entirety by accurately marking the pavement with paint, using an encircled dot for the stations and a plus sign for the intermediate points.

The final survey on most projects consists of locating the construction center line, obtaining elevation for the profile, and the re-running of cross sections over the location of the preliminary cross sections. However, in some instances where expedient or practicable, payment for roadway excavation without the re-running of the cross sections is made on the basis of the plan quantities by mutual agreement between the contractor and the engineer. Channel sections are taken after the satisfactory completion of the channel change.

Portions of the project may be completed and accepted as indicated in the specifications before the completion of the entire project.

#### District Office Checking

The field estimate book is used by the district final department for the compiling of the final quantities. All the quantities for the various items must be computed in the field and the amount shown in the column headed "Field Quantity," except as otherwise noted. All supporting data as furnished in the inspector's field books, sketches, field plan and standards are checked at the district office. Here the first final computer enters the quantities, as taken from the inspector's field records, in the columns headed "Checked Final Quantity" and arrives at a total for each item in the contract. The second final computer then checks the accuracy of the transfer and the addition, and indicates agreement by a check mark in the column headed "2nd Check." Disagreement is indicated by circling the entry of the first computer and any error is rectified immediately upon consultation with the first computer. In this way, the large amount of work triplicated in preparing the old Forms has been eliminated.

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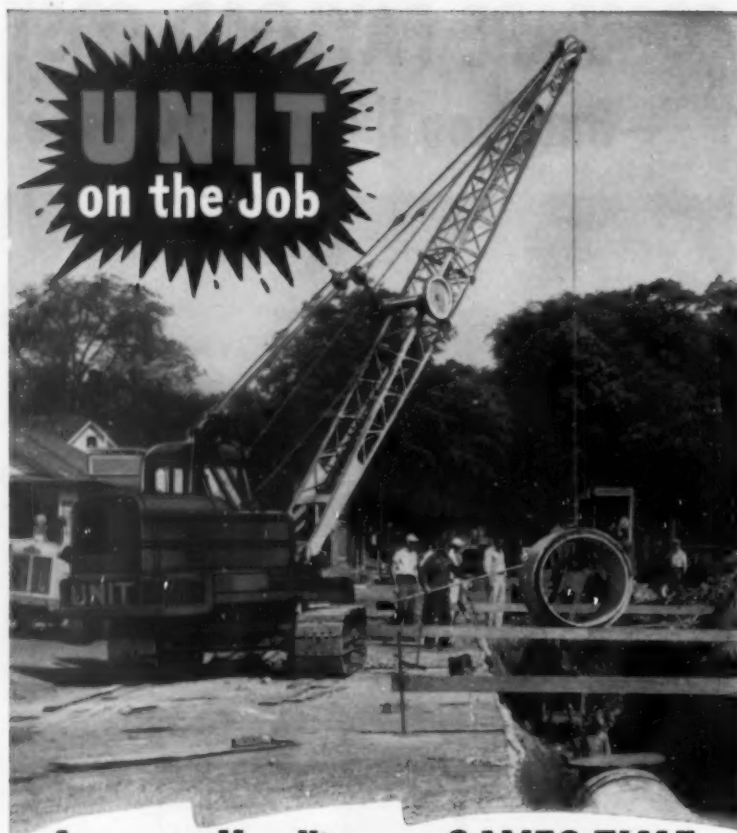
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Summary" sheet is used of the old Form series and is inserted in the field estimate book by the district office final department after all the quantities have been checked and summarized. If necessary for district office records, a copy is made of this completed final estimate by a junior draftsman.

### Structure Records

Structure records show the dates when excavation was begun and completed for each foundation; the character of material encountered down to the footer elevation; and the date and class of concrete placed for various sections. A mimeographed sheet for recording all bridge data may be inserted in the field estimate books. All actual footer elevations and dimensions are required to be shown. By comparing computed volumes with the number of batches and yield, serious disagreements with the contractor may be avoided when the finals are submitted to him at a later date.

When the excavation for a foundation has been completed to plan depth, the district engineer is notified that the foundation is ready for inspection. The district engineer or his representative inspects and approves the foundation material before any concrete is placed for the footing. Soundings are made by rods, drills or other suitable means to determine the stability of the material below. Unstable or unexpected foundation conditions which are found after the contractor has completed the excavation are reported immediately to the district bridge engineer for possible redesign of foundation.

On standard bridges plan quantity of concrete and reinforcement are accepted for concrete deck and parapets if built according to standard drawings. Usually a simple statement is adequate if it gives the standard bridge number, the quantity of concrete and steel, and verification that dimensions are not less than standards.

Detailed sketches, measurements and computations are kept for all abutments, piers, wing walls and special bridges. These sketches are submitted to the district office as soon as the various bridge operations are completed.

Measurement and payment of plain and fabricated structural steel are based on the scale weight or the computed weight, at the option of the contractor, who must advise the bridge engineer which is selected. Payment for computed weight is based on the theoretical weight of

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all metal shown on the approved shop drawings. Whereas, payment for scale weight is based on the total scale weight of all metal shown on the approved shop drawings according to the Specifications, except when the total scale weight of metal for any structure exceeds the theoretical computed weight by more than 1%, including the allowable weight of shop paint. Weight overage which is more than 1% above the computed weight is not paid for; whereas, if the total scale weight of metal is between 98% and 100% of the computed theoretical weight, payment is based on the actual scale weight.

The contractor is required to furnish the bridge engineer with copies of itemized lists showing the computed weights of all metal comprising the items of plain and fabricated structural steel for each structure. A copy is then furnished to each district office by the bridge engineer.

## Summer program for highway instructors

An 8-week summer program of advanced study in highway engineering, open to instructors in engineering colleges, will be held at the University of California, Berkeley, beginning June 20, 1955, with the cooperation of the Institute of Transportation and Traffic Engineering. Twenty grants-in-aid of \$650 each are available to make practicable the enrollment of instructors from throughout the U.S. made possible by a grant from the Automotive Safety Foundation.

The two courses carrying graduate credit are Highway Planning and Economics, to be conducted by R. A. Moyer, Institute research engineer and former chairman of the Highway Research Board; and Advanced Traffic Engineering, to be conducted by D. S. Berry, assistant director of the Institute.

Tentative seminar subjects are: geometric design of rural highways and expressways; freeway programs and programming; highway finance and administration; pavement design; urban transportation; methods of teaching highway engineering; visual aids and demonstrations. A three-day field trip to the Los Angeles area is being planned as part of the program.

Tuition for the program will be \$75 (G. I. benefits may be used). Applications for grants-in-aid should be submitted by March 14. Forms and further information may be obtained from the Institute of Transportation and Traffic Engineering, University of California, Berkeley 4, Calif.





● H. A. Radzikowski who helped present the ARBA Task Committee reports on the Industry's capacity at New Orleans; with Senator Dennis Chavez and Col. E. R. Needles, consulting engineer. (Right): Commemorating recent affiliation of the Ohio Contractors' Association with ARBA, Jennings Randolph (ARBA treasurer) conferring certificate to President H. B. Fenton and Vice-President P. G. Heffner of the Ohio group.

## ARBA Holds "Sleeves Up" Meeting

*New Orleans convention delegates hear of industry's ability to handle bigger road program. Contractor attendance large, and technical sessions were well attended.*

THE ability of the roadbuilding industry and profession to triple its pace was the key topic at New Orleans, where the American Road Builders' Association held its 53rd annual meeting, January 10-13.

In a program dominated by the impending recommendations of the President's Highway Advisory Committee, these were some highlights:

- Governor of Louisiana Robert F. Kennon, who is chairman of the Governor's Conference, told delegates that the nation's state governors are in hearty accord with the President's highway proposal. However, "the biggest portion of the problem should be borne by the states," suggested the governor, who proposed a 2-for-1 matching basis.

- Several congressional leaders endorsed the President's program, although not without some reservations as to details, and with important sidelights on the problems involved.

- ARBA's survey of the industry's ability to build \$101 billion in roads in 10 years was presented in a memorable all-morning session.\*

- William Randolph Hearst, Jr., chairman of the Hearst newspaper chain and a staunch good roads backer, addressed the meeting in one of his rare personal appearances.

- An exhibit of sixty materials and supply manufacturers, held in conjunction with the convention, was well attended.

### Congressional Sentiment

The need for vigilance to keep an enlarged road program from falling into "political" hands, was voiced by Sen. Dennis Chavez (D-New Mex.), chairman of the Senate committee on public works. He noted however that a program based on partisanship would not be sponsored by President Eisenhower. "I do not have any fears as far as the President is concerned," he said, "but do fear some of those connected with the road program in the lower echelons. We'll have to

watch them very closely in committee."

Rep. Jesse P. Wolcott (R-Mich.), ranking minority member, House committee on banking and currency, and a long-time ARBA friend, reminded that we should plan roads for a vastly expanded national production, which may reach \$535 billion annually by 1960, compared with \$356 billion today.

Rep. J. Harry McGregor (R-Ohio), ranking minority member, House subcommittee on roads, said that we must merit confidence of the public in the vast expenditures ahead; we must get a full dollar's worth of roadbuilding for the money. McGregor also spoke of the political danger, saying that the road funds must be kept "for roads, not politics."

Sen. Francis Case (R-S. D.), ranking minority member, Senate subcommittee on roads, criticized "generalities," saying that a searching examination on financing and political aspects of the road program would be made in hearings.

Rep. George H. Fallon (D-Md.), chairman of the House subcommittee on roads, assured speedy action following the President's special message to Congress. He said that hearings would start at once on the road program, although there will be some question as to approval of the program in its entirety. Fallon, like the other congressmen present in New Orleans, is conscious of the vital need for better highways, for safety, economic advancement, and defense.

One of several interesting technical sessions, the conference on soils engineering was led by Earl F. Bennett,



● ARBA's new president, John N. Robertson, Director of Highways, District of Columbia.

\*Previewed in JADWAY ROADS AND STREETS, "Can Industry Handle a \$100-Billion Road Program," pages 52A to 52H.



● General Eugene Reybold, ARBA's executive-president, with Capt. Charles M. Noble, chief engineer of the New Jersey Turnpike Authority and vice-president-elect.

chairman of ARBA's committee on soils compaction and manager road sales, Koppers Company. Two papers were presented on subjects involving swamp muck displacement. One by James P. Exum, of Howard, Needles, Tammen & Bergendoff, told of foundation problems on the Maine Turnpike. One by J. F. Tribble discussed embankment construction across marsh areas, with examples taken from projects throughout the South.

A discussion period on soil mechanics brought out a number of interesting points:

● On the subject of swamp or tidal mud displacement, Nello L. Teer, Jr., North Carolina contractor, emphasized the importance of keeping the mud wave softened with explosives. In his opinion, from wide experience, blasting is often the cheapest way of handling this work efficiently, coupled with ample surcharge.

● The growing interest in soil mechanics by highway departments also came in for comment from Mr. Teer. He noted the improvement in sub-surface data being made available on construction plans through electrical resistivity and other methods. Such information helps reduce bidding risk, and hence encourages lower bid prices, he said.

● Mr Teer made a third point: "Get the compaction out of the laboratory and get the lab men off the job," he pleaded, meaning that practical judgment in his opinion is required oftener than job decisions based on lab conditions. "There is need for some system of compaction control that even a contractor can understand," said Teer. "Equipment men, engineers and contractors should get on common ground on this subject."

● John P. Moss, of Moss-Thornton Construction Co., Leeds, Ala., another panelman, noted the encouraging

number of contractors who had enough interest in soils to attend this session. He ventured that the day of the light (150 psi) sheepsfoot roller is over. "With today's fast-moving, high-capacity earthmoving equipment, a larger and different kind of equipment must be found," he commented. "We would like to see the specifications changed. We can't compete using these little rollers." He also asked that contractors be allowed more often to reflect rolling costs in their bids.

● J. W. Rosenthal, soils engineer, Louisiana department of highways, told of a practical approach used in his state. When the contractor is unable to compact to 95% density to meet specifications, the department men get together with him to devise a way out. One plan that has been

practicable is to ease the density requirement for lower lifts, permitting the contractor to get a working platform for his equipment, with whatever compaction he can secure. Then he can start improving his results, due to ability to get equipment through and work under dryer conditions. The specifications should say that such a procedure is permissible, noted one contractor in the audience.

O. J. Porter, of Porter, Urquart & Beavin, consulting engineers of Newark, N. J., noted that the contractor would like to be paid on a basis of compaction effort. He stated the case for the efficiency of the 50-ton rubber-tired compactor, citing data developed at the Vicksburg laboratory of the Corps of Engineers under varying tire pressures. He noted that seventy rubber-tired 50-ton rollers were used by contractors on the Ohio turnpike in 1954, without being required by the specifications — the answer being that the big units compact an assortment of materials at costs of 2 to 3 cents per square yard less than by other methods.

Moderator Bennett in this connection observed the established fact that compaction efficiency drops with the number of passes required. It is costing the state unnecessary money to require methods involving an uneconomic number of passes. The industry, he feels, should work toward a single-pass method for modern road-building.

A. O. Williamson, of Wm. Bros. Boiler & Manufacturing Co., also on the panel, told of the drop in purchase price of large rollers. The 50-ton compactors are also relatively economical to operate; they weigh only 9 tons empty, and hence can often be towed by light tractors or other equipment. He mentioned the growing practice of rubber-tired rolling of asphaltic pavement layers to secure better densities.

Among those in the audience who made closing comment was Murray Shaffer, of Buffalo-Springfield Company, who told of the results being obtained from the 16-ton Kompactor segment rollers recently out on jobs. And A. W. Davis, of Electric Tamping & Equipment Co., commented briefly on the experience with vibratory tamping units. He said that in general soils having less than 10% passing the 200 mesh are susceptible of vibratory compactor; soils with 10% to 15%, "maybe;" soils above 20%, not usually effective. Vibratory methods have been improved for compacting behind abutments and in other places not accessible to heavy moving equipment.

#### ARBA OFFICERS FOR 1955

*President:* J. N. Robertson, director of highways, District of Columbia. Succeeding Robert M. Reindollar.

*Regional Vice-Presidents:* Charles M. Noble, chief engineer, New Jersey Turnpike Authority; Charles M. Smith, Smith Engineering and Construction Co., Pensacola, Fla.; Julien R. Steelman, president, Koehring Co., Milwaukee; George T. McCoy, state highway engineer of California.

*Treasurer:* Jennings Randolph, assistant to the president, Capitol Airlines, Washington, D. C. (Re-elected).

*Directors:* Elected to board were John T. Moss, Moss-Thornton, Const. Co., Leeds, Ala.; George H. Kimber, Calcium Chloride Inst., Washington, D. C.; Ben H. Petty, Professor of Highway Engineering, Purdue University, Lafayette, Ind.; O. W. Merrill, Columbus, Ohio; W. B. Greene, Barber-Greene Co., Aurora, Ill.; A. L. Burras, Nashville, Tenn.; George M. Foster, Michigan state highway department, Lansing, Mich.

*Manufacturers Div. (Construction Industry Mfrs. Association):* Kenneth Lindsay, Iowa Manufacturing Co., president.

*Materials and Supplies Div.:* J. E. McCracken, Bethlehem Steel Co., chairman; E. W. Bauman, vice-chairman.

*County and Local Div.:* Allan M. Williams, county engineer, Ionia County, Mich, president.

*Municipal and Airport Div.:* T. J. Montgomery, Cincinnati, president.

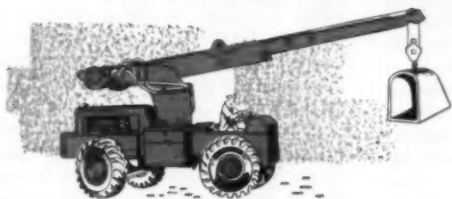
*Educational Div.:* Calvin R. Reen, State College, Penn., president.

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THAT JOB...  
YOUR JOB...

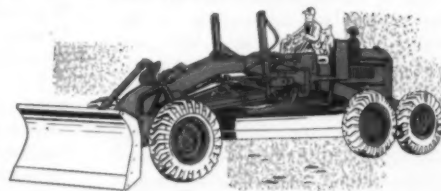
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# Research Engineers Hold Record Meeting

*Over 200 papers presented at Highway Research Board Annual meeting, reflecting continued expansion of Board's activities.*

**R**ESearch was in the forefront in January, as more than a thousand of road-building's technical men met in Washington January 11-14 for the 34th annual Highway Research Board meeting.

The 200 or more papers and committee reports given encompassed 38 technical sessions, while 62 committee business sessions were held. The participants included representatives from 26 universities and colleges, 27 state highway departments, and 29 other agencies including the Bureau of Public Roads, other federal agencies, city and county departments, consulting groups, manufacturers, foundations, and foreign governments.

Further emphasizing the breadth and extent of the Board's unique program, the January meeting covered such varied aspects as road design and construction; soils and materials problems; traffic and vehicle operation; night-time vision and sign legibility; and many other problems. A growing program of inquiry was also revealed on the important economic, psychological and sociological problems of highway transportation and of modern urban development.

One of the highlights was the presentation of special awards at the opening session. The Roy W. Crum Distinguished Service Award was conferred on Ralph A. Moyer, associate director of University of California's Institute of Traffic and Transportation; on Burton W. Marsh, director, Safety and Traffic Engineering, American Automobile Association; and posthumously on Walter H. Root, late deputy chief engineer of the Iowa State Highway Commission.

The annual award for the author of the best paper presented at the previous annual meeting was conferred on Claude A. Rothrock, planning engineer for the West Virginia State Highway Department, for his paper "Urban Congestion-Index Principles."

The George S. Bartlett Award was conferred on James A. Anderson, commissioner, Virginia State Highway Commission. This Award, given annually to one individual for outstanding contribution to highway progress,



● Bartlett Award for outstanding service being presented at Research meeting to Commissioner J. A. Anderson of Virginia (facing), by chairman G. Donald Kennedy.

is made jointly by AASHTO, ARBA and the HRB.

## Selected Session Notes

● **Sand Drains.** The versatility and economy of the sand drain method to solve various soil and drainage problems were illustrated in several reports. On a Virginia project, sand drains were installed to carry water downward to prevent a cut slope from sliding. Reported in paper, "Control of Slides by Vertical Sand Drains," by William T. Parrott, Virginia Department of Highways.

For an Oregon highway embankment over peaty soil, drains were placed along the embankment toes to control lateral movement caused by horizontal flow of pore water, as described in paper, "A Modification of Sand-Drain Principle for Pressure Relief in Stabilizing an Embankment Foundation," by Ray Webber and W. C. Hill, Oregon State Highway Department.

A paper "Stabilization of Marsh Deposits, Swimming River, Red Bank, New Jersey" by S. I. Tsien of Edwards, Kelcey, and Beck, consulting engineers, tells of a substantial savings in costs and paving time achieved by a carefully designed, installed, and controlled sand drain system on the Garden State Parkway. Rapid settlement without excessive shear failures was obtained, there was close correlation between actual and anticipated settlement totals for maximum fill

height of 23 ft. In the deepest layer of compressible material, there was a maximum settlement of 18 ft. after approximately three months of fill overload. A total of 434,000 lin. ft. of vertical sand drains were placed, averaging 32 ft. deep, using a closed-end, 20-in. mandrel with removable bottom.

● **Soil Cement.** Streamlined testing procedures for soil-cement, developed by the Portland Cement Association, were described by J. A. Leada-brand and L. T. Norling. Designed to save time and labor, the method reduces or eliminates certain test specimens required under established procedures. Cement content percentages are expressed on a soil weight rather than volume basis. Only one moisture-density test is necessary. Even more simplified methods are given for sandy soils and for emergency or small jobs. The modified and shortened procedures are made possible by evaluating and correlating 10 years of experience and tests of soil-cement practice.

● **Bridge Floors.** Of particular interest to those facing the problem of modernizing existing structures for heavier load capacities was a report on thin asphalt-aggregate wearing courses for deck surfacing on two California bridges, one with wood deck and the other with steel deck. The report is titled "Use of Asphalt-Latex Emulsion in the Construction of Thin Wearing Surfaces for Steel Bridges and Structures," by Ernest Zube, California Division of Highways.

Experimenting with asphalt-latex emulsion as binder for an aggregate cover, the California division found that it gave satisfactory performance and resistance to traffic impact and wear, as well as indicating good bonding and non-skid qualities. The test results indicated some important applications could possibly be made of this type of surfacing. Replacement of heavy concrete decks with lightweight steel, plus thin asphalt surfacing, may reduce dead load sufficiently to permit heavier traffic capacities on some existing structures. Where steel decks may occasion hazardous driving conditions, such asphaltic surfacing could greatly reduce accidents, and yet not impose too much added weight to the structure.

● **Culvert Studies.** Two detailed studies were disclosed on the per-

formance of 66 and 84 in. multi-plate metal culverts under two deep fills, 168 ft. and 137 ft., respectively. Their performance as indicated by stress, deflection and displacement measurements, points to possibly greater use of cheaper fill construction in lieu of more expensive bridging of certain watercourses and valleys. The papers: "Load Study of Flexible Pipes Under High Fills," by J. H. Timmers, Armeo Steel corporation; and "Progress Report of Performance Study of a 66-in. Multi-plate Corrugated Metal Pipe Culvert Under 168-ft. Highway Embankment," by Nicholas C. Costes and Charles E. Proudley, North Carolina State Highway and Public Works Commission.

• **Flexible Pavements.** Rational design of flexible pavements still requires the investigation and equation of several variables and factors. The California Division of Highways is currently studying pavement fatigue and the deflection and distortion which pavements can satisfactorily withstand under repeated traffic loads. This involves correlating actual deflection, as measured by rods buried in the subgrade and base, with type and volume of traffic and type of pavement design. The phenomenon of rebound is considered an important factor with respect to pavement life, and is a closely related objective in this study. Reported by F. N. Hveem of California in "Pavement Deflections and Fatigue Failures."

• **Airfield Pavement.** Tests are being conducted by the Civil Aeronautics Administration on the relative effectiveness of base and subbase materials in protecting subgrades from overstress. The design approach is centered on total pavement quality rather than total thickness for obtaining design load carrying capacity. It is thought that in some cases it may be more practical and economical to use higher quality materials of less thickness than lower quality materials of

greater thickness. By increasing pavement thickness, base course depth can be reduced accordingly or by increasing the quality and thickness of the base course, subbases can in turn be thinner. Another objective is to correlate triaxial tests on a quantitative basis to base materials. Report was given in, "The Effect of Base Course Quality on Load Transmission Through Flexible Pavements," by Raymond C. Herner, Civil Aeronautics Administration.

• **Joint Pumping.** More research was reported to be needed on pavement pumping in relation to sub-grade and base conditions. This major problem is largely caused by heavy axle loads, free water, and certain fine-grained subgrade soils. Reports on Ohio and Indiana test projects confirmed the effect of these subgrade and traffic conditions on pumping. "Report on a Concrete Pavement Research Project in Indiana," by Walter T. Spencer, Indiana State Highway Department; and Harold Allen and Preston C. Smith, Bureau of Public Roads; and in paper, "Report on a Concrete Pavement Research Project in Ohio," by Charles W. Allen, Ohio Department of Highways, and Larry D. Childs, Portland Cement Assn.

• **Expansion Joints.** The importance of adequate expansion joint design was brought out in a report by William Van Breemen of the New Jersey State Highway Department. Experiences of this organization have shown that some concrete pavement failures were attributable more to poor expansion joints than to structural deficiencies. Certain joint devices developed badly corroded and rusted dowels and sleeves, which were practically worthless for load transmission after an unexpectedly short time.

Through experimentation the currently specified joint device was determined to be the most satisfactory even though of slightly higher initial cost than others. It consists basic-

ally of a 1½x18 in. cold-drawn dowel bar tightly encased in the tubing of either monel metal or stainless steel with some type of coating. The tightness of the encasement is such that movement is between concrete and tubing rather than tubing and dowel bar. The additional cost of this type of device is felt to be justified since joint spacing is now at 78-ft. intervals, less joint maintenance is necessary, and overall joint life and performance is much better.

• **Concrete Resurfacing.** A detailed paper by W. G. Bestor, Portland Cement Association, and J. W. Johnson, Iowa State Highway Commission, covered Iowa's 20-year experience with p.c. concrete resurfacing. Both reinforced and plain concrete slabs were laid in thicknesses generally of 4 and 6 in. Existing surfaces are broomed and cleaned of loose materials before overlaying, but no type of bond is provided. Bonding of old slab to new was found unnecessary, and no adverse or unusual effects have thus far been noted. Reflection cracking has not been serious or pronounced, as truck traffic is much lighter than in some other states. In some cases, a marginal class of aggregates have been found satisfactory in overlays. Contraction joint sawing is now a current practice on most overlays.

• **Shoulder Maintenance.** Group discussion in a panel meeting on this subject indicated that there may be a distinct trend toward full-width shoulders. Some desirable characteristics of shoulders from a maintenance standpoint were summarized to include: (1) Adequate slope and proper materials for drainage, (2) Tight joint between shoulder and pavement edge, (3) Proper type of shoulder for class of highway, (4) Visual and surface differentiation between pavement and shoulders, and (5) Load supporting capacity sufficient to bear occasional traffic of particular highway.



• Roy W. Crum Award winners for distinguished highway service, seen during ceremony at Research meeting. Ralph A. Moyer, University of California; Mrs. Walter H. Root, widow of late Iowa engineer; Burton W. Marsh, of American Automobile Association.

# California Leads in Free Expressways

*Legislative support and advance planning considered key to state's phenomenal post-war roadbuilding achievement. Over 182 miles of access-controlled urban and inter-city facilities completed in past 1½ years without tolls.*

**By George T. McCoy**

State Highway Engineer of California

**I**N California we believe that our recent progress in correcting critical state highway deficiencies has demonstrated several facts. It has shown that accelerated plan production schedules and right of way acquisition can, in a relatively short period, be geared to meet a more than doubled volume of construction. It has also demonstrated that the capacity of the construction industry in California is equal to the task without a decrease in the level of competition.

The value of construction contracts under way, as of the first of each of the past five months has been in excess of \$200,000,000. The total construction expenditure during the 1954-55 fiscal year (including engineering and right of way) will amount to \$246,000,000. Under the 1955-56 budget recently adopted \$221,000,000 will be expended for construction purposes. This reduction is predicted on existing legislation which provides for reduction July 1, 1955 of one-half cent per gallon in the motor fuel taxes and proportionate reduction of

other user taxes. Governor Knight has announced that he will recommend to the Legislature the continuance of the taxes at the present level. If the Legislature should take affirmative action, an additional \$25,000,000 will be available for construction.

Advance planning has, of course, been the key to the highway progress in California. We have been proceeding for a number of years on a state-wide planning policy, for both urban and rural state highway routes. The planning has been integrated carefully with the amounts of revenues derived from highway user taxes made possible by a very positive and realistic California legislature program to meet the highway needs. Except for a few over-water crossings, the entire concept has been for a free system of highways.

Detail planning was well advanced for additional projects beyond previous fund limitations when increased highway user taxes went into effect on July 1, 1953. Many of the projects which were advanced immediately to the construction stage would necessarily have been deferred for several years if the additional funds had not become available. But the end result — the full effect and impact of the accelerated construction program, is of course, just now reaching the motorist.

This is exemplified most pointedly by the progress of the freeway program. Since enactment of the California freeway law in 1939, this state has been endeavoring to meet its most critical traffic needs with development

of an ever increasing mileage of freeways. For lack of adequate finances, the progress has been behind the growth of needs in past years. Now many short sections of freeway are beginning to connect up and provide for vastly improved travel on the major routes.

When the legislation providing increased revenues went into effect on July 1, 1953, California had only 90 miles of full freeway, with all cross traffic on separate grades. Seventeen months later, on December 1, 1954, 169 miles of full freeway were in operation, with another 124 miles under construction and 89 miles more financed for construction next year. When these projects are completed within the next two years, California will have 382 miles of full freeway.

The expressway progress (divided multi-lane highways with access control but with some intersections at grade) is equally encouraging. On July 1, 1953 there were 569 miles of expressway in operation. Seventeen months later, on December 1, 1954, there were 672 miles in operation, with another 92 miles under construction and an additional 56 miles budgeted. When completed in the next two years, this will provide a total of 820 miles of expressway in addition to the 382 miles of full freeway.

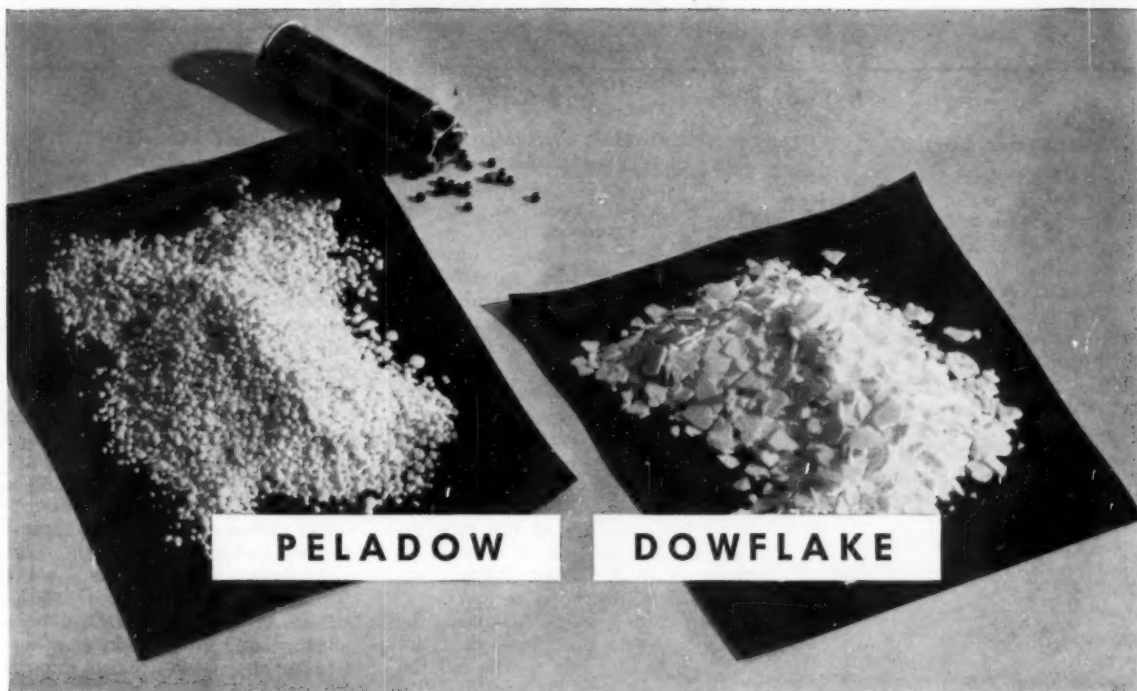
Together with other divided multi-lane mileage without access control, the California motorist will soon have 1,639 miles of divided multi-lane highways.

Part of this construction acceleration has, of course, been made possible by the increased Federal funds under the Federal Aid Highway Act of 1954. The future developments under the proposal of President Eisenhower are naturally of great interest to all highway authorities. In California immediate and effective use can be made of additional Federal funds such as the very large sums mentioned for the interstate system.

The progressive legislative and planning steps taken by California have made possible the first substantial dent in a huge backlog of accumulated highway deficiencies. Further progress is in sight. But as in any long-range campaign, joint effort is needed. California, like other states, can look forward to really adequate highways only if the Federal Government recognizes and assumes its full share of the national responsibility.

- California's 246-million-a-year program proves state's capacity for rapid doubling of roadbuilding.
- Advance state-wide planning on long-range basis is key to state's road progress.
- Effect of postwar effort only beginning to bring full benefits to motorists, emphasizing "long lead" necessary in planning.
- Full freeways (all cross traffic separated) today total 169 miles — up 69 miles in year and 124 miles more under way
- State-built expressways (partial control) will soon total 820 miles.
- Joint state-federal effort held necessary to complete long-range program.





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cium chloride to control ice and dust on highways and secondary roads. By stabilizing the gravel roads in your area with these products, gravel loss can be reduced up to 85%.

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# DIGEST of Current Technical Literature

By JOHN C. BLACK, Associate Editor

## Cements are better

Tests by a Pacific Coast company using revised water-cement ratios, showed significant 28-day strength increases in the 1953 product as compared with 1948. Five brands were tested, with varying results.

"The greatest differences between brands of cements are reflected in the compressive strengths.

"There are some significant changes between the water-cement ratio curves of 1948 and 1953 shown in Fig. 1.\* A concrete design, using 7 gal. to a sack of cement would yield strengths of 3500 psi. to 5400 psi. at 28 days, depending on the brand cement used today. In 1948 the same mix would have made concrete of 3200 psi. to 4300 psi. compressive strength. Brand C and brand B have shown little change (300 psi. increase). Brand A and Brand E have increased strength yield about 900 psi. An interesting comparison is made with brands F and J. These cements are made at the same plant. We used brand F in 1948 but now use brand J. We enjoy 1000 psi. more compressive strength in 1953 than brand F gave us in 1948. For the specifications, the 28-day compressive strength is the important age. These wide differences at 28 days are overcome at 90 days. Cements that make high 28-day strengths have smaller gains after that age.

"Our six sack mix in 1953 gave 600 psi. more compressive strength than in 1948. Sampling and testing, production and aggregates have not made the whole difference. We believe cements are better; yet, we wonder a little about tomorrow."

"Tests Prove Cements are Better," by E. L. Howard, Testing Engineer, Pacific Coast Aggregates, Inc., Rock Products, 309 W. Jackson Bld., Chicago 6, Ill., May, 1954.

## The "cable truss" — a radical development

Truss action in a structure composed wholly of cables — anomalous to normal engineering thought — becomes a fact for live load stresses when the cables are properly stressed by dead load. In principle it is like prestressed concrete, with reversed

stress directions. Practically, it has been applied with marked economy in small and medium span suspension bridges, and is under consideration for larger structures.

Most important and, let us say, most daring of such structures to date is the San Marcos bridge (*El Puente del Litoral*) in Central American El Salvador — 2 lanes — H15-S12-44 standard loading — 4 towers, center span 669 ft., two side spans of 520 ft. each, and anchor spans of 250 ft. — total length 2209 ft., exclusive of approaches. It has been in service, with complete satisfaction, since 1952.

Earlier examples of the type included laboratory models, a small office footbridge, and a 5-span footbridge over the Delaware River.

In part statically indeterminate, the cable truss design was worked out through the aid of models and the careful application of engineering judgment. In the case of the San Marcos bridge, final positioning of some of the suspender and stiffening members was left for field determination under specific test loads and deflections.

As is customary in Latin America, bids were taken to cover both design and construction. The H15-S12-44 loading was specified by the Salvadorian government, with type of structure optional to bidder. Competitive designs included cantilevers, arches, and conventional suspension spans. The bid of John A. Roebling's Sons Corp. for a cable truss structure was low by about 20%.

With dead load carried in suspension, the main cables served directly as upper chord of the live load truss. Live load lower chord was formed by two stretched cables — the only prestressed members in the entire structure. As in a normal through truss, the bridge floor is supported by the lower chord, but without participating in truss action.

Center span main cables have the relatively small sag of 8% of span length. Upper to lower chord spacing is 25 ft.

There are no vertical suspenders cables serving as dead load hangers and live load web members being inclined at angles from 30 to 45 degrees from vertical to meet the latter function. Suspension points are unequally spaced, as are also the low-

er chord panel points. The four towers are rocker-mounted. Somewhat startlingly, a concentrated live load at mainspan center, moves the tower tops away from, instead of toward, each other.

Connections of the "hanger-web" cables to the stressed lower chord cable were ingeniously designed to provide for the necessary field adjustment of position.

A 36-in., wide-flange, rolled section suspended directly below each lower chord cable supports the floor and provide local stiffness, but is not figured as a truss stiffener. Actually it is deeper in proportion than the stiffening girders of the original Tacoma Narrows bridge.

Harmonic vibration within any one suspension span is prevented by the stiffness of the span at the quarter points; while harmonic relation of one span to another is avoided through the use of suitable span lengths.

Two years of service have demonstrated the complete adequacy of the San Marcos stiffening, but beyond that the earlier model tests showed an astonishing rigidity developed by the cable truss. While warning against the danger of too sweeping conclusions from these indications, the author notes that "such a truss designed into the Golden Gate Bridge would produce an effective stiffness of over 80 times that provided."

"San Marcos Bridge — A Prophetic Design in an Out-of-the-Way Place" by Blair Birdsall, Chief Engineer, Bridge Division, John A. Roebling's Sons Corp., Trenton, N. J.; and "Cable Truss Design Greatly Increases Stiffness" by Norman J. Solenberger, F. Van Buren & Co., San Salvador C. A., CIVIL ENGINEERING, 33 W. 39th St., New York 18, N. Y., September, 1954.

VERTICAL SAND DRAINS. Bulletin No. 90. Published by Highway Research Board Committee on Survey and Treatment of Marsh Deposits. Includes article "Checking Up On Vertical Sand Drains" by Wm. S. Housel and discussion by L. A. Palmer; and "Hawaii's Experience With Vertical Sand Drains," by K. B. Hirashima. Also appendix sections giving cost and other data. For copy address the Highway Research Board, 2101 Constitution Ave., Washington 25, D.C.

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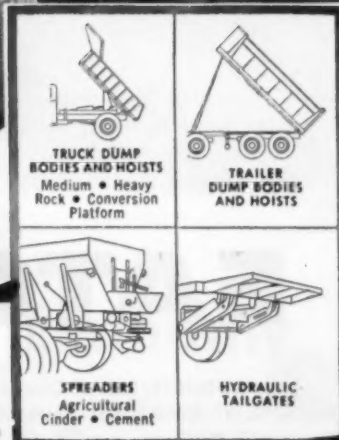
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*Try the comfort!*

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A new **MONEY MAKER** for sand and gravel delivery—the '55 Ford T-800 Tandem Axle Big Job! Powered by the mighty Short-Stroke 170-h.p. Cargo King V-8, it is rated for 40,000 lbs. GVW, 60,000 lbs. GCW. Master-Guide Power Steering is standard equipment!

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Small wonder, then, that the truck industry is now investing millions of dollars *under the hood* . . . in a revolutionary switch to Short-Stroke V-8's.

But Ford, pioneer in V-8 truck power, made the switch over three years ago. And right *now*, you'll find a *proven*, modern Short-Stroke engine under the hood of every Ford Truck. Only Ford offers a full line of Short-Stroke engines . . . four V-8's and a Six.

Make sure your next truck is a modern Money Maker. Look *under the hood*! Look for a modern Short-Stroke engine with a "stroke" as short as, or shorter than its "bore." And remember, you get the full advantages of Short-Stroke design *today* in any Ford Truck you choose.

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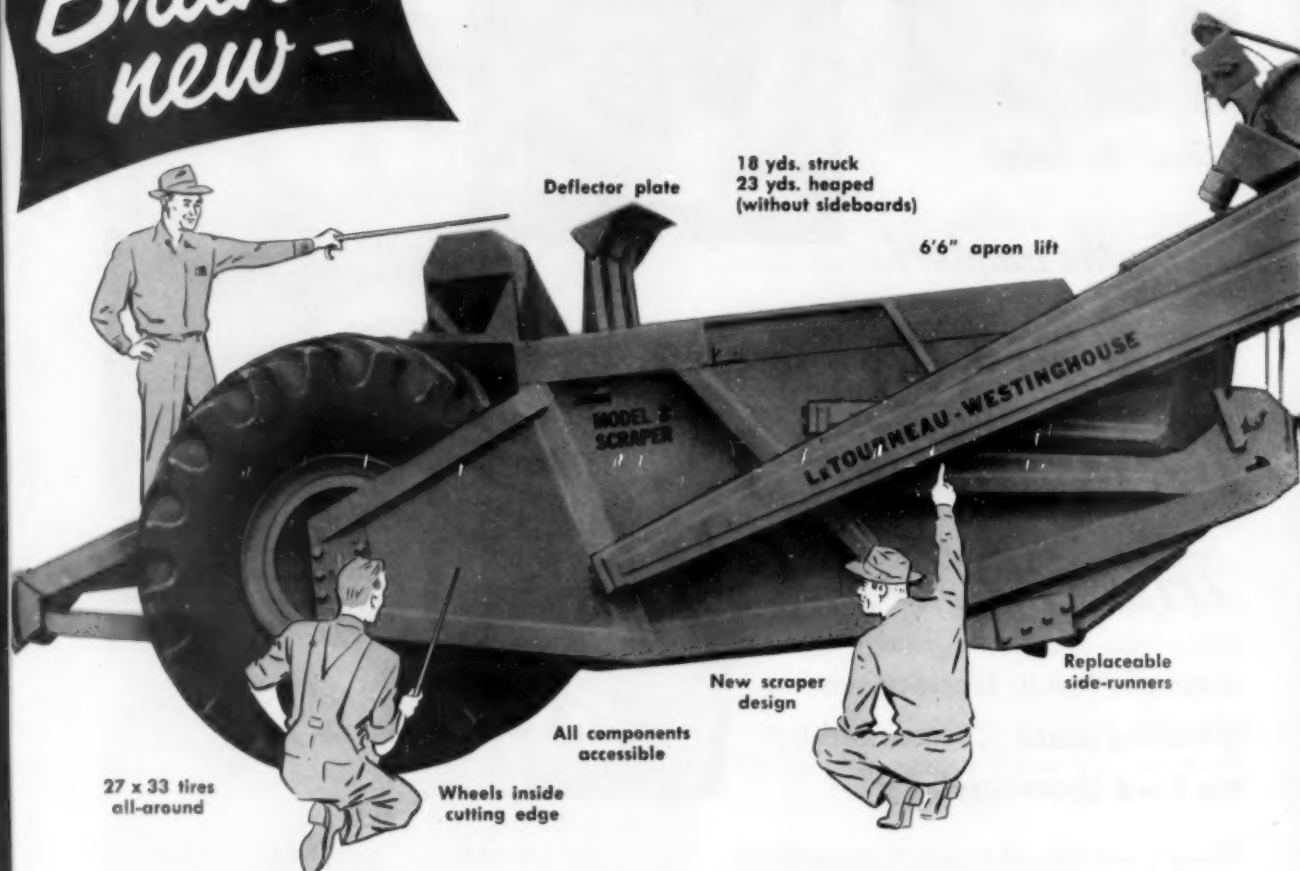
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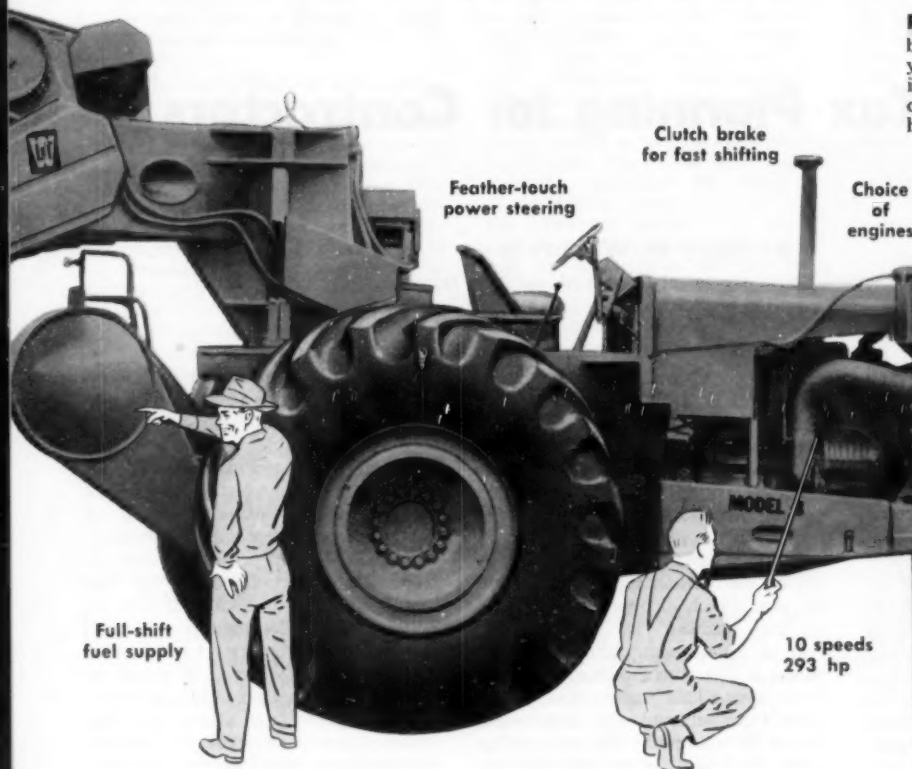
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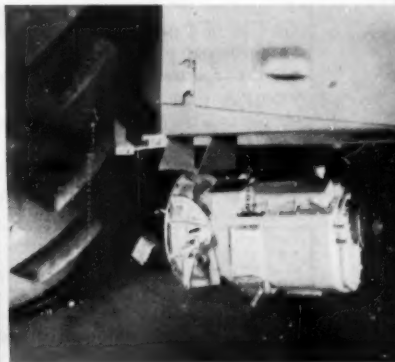
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## NEW DEVELOPMENTS IN

# Income Tax Planning for Contractors

**By Harry W. Wolkstein**

Certified Public Accountant (New York and New Jersey)

CONGRESS has recently completed an extensive revision of the Internal Revenue laws. The changes enacted will affect the tax liability of every taxpayer. Those provisions of the new law which are of importance to all roadbuilders are discussed below. The courts have also been active in interpreting the tax laws. Recent decisions that have been handed down serve as important guides in keeping your income tax bill at a minimum.

### **Tax Accounting**

A new rule regarding changes in accounting periods by partners and partnerships has been written into the federal laws. Under this rule, a partnership may not change to a taxable year other than that of its principal partners, and a partner may not change to a taxable year other than that of a partnership in which he is a principal partner, unless a valid business reason for the change is shown. A principal partner, for this purpose is a partner having an interest of 5% or more in the partnership profits or capital. These new provisions apply to any partnership which adopts, or

changes to a taxable year beginning after April 1, 1954, and to any partner who changes to a taxable year beginning after this date.

This change closes a loophole in the old law under which a partner could postpone his tax liability with respect to the income of a new partnership by as much as 11 months by having the partnership adopt a taxable year which did not coincide with his own taxable year. The taxable year of a partnership shall be determined as though the partnership were a taxpayer. This means that where consent to change the accounting period is obtained, the partnership must annualize its income for the short taxable year.

Under the old law deductions for expenses and losses incurred by a taxpayer could be taken only when all events have occurred which fix the fact and the amount of the liability. In many cases, this was at variance with generally accepted accounting principles, which require all determinable liabilities relating to reported income to be taken into account.

The new law conforms the tax

treatment of expenses more closely to general business treatment by permitting an accrual basis taxpayer to deduct reasonable additions to reserves for estimated expenses. The expenses must be related to income taxed during the year (except for adjustments or corrections of previously established reserves), and must be allowable deductions which the taxing authorities are satisfied can be estimated with reasonable accuracy. A reserve is to be considered reasonably estimated when it is based on reliable data or statistical experience of the taxpayer or of others in similar circumstances. Reserves for general contingencies, indefinite future losses, or for amounts in litigation do not fall in this category.

At the close of each year, the reserves are to be adjusted to reflect the best estimate currently available; any amount by which a reserve is found to be excessive is to be taken into account in the year of determination.

The election to establish reserves for estimated expenses is not available with respect to any deduction attributable to income reported in a taxable year beginning before 1954, or to prepaid income which the taxpayer has elected to defer.

Types of reserve expenses which roadbuilders can now estimate and deduct include repairs or replacements which will have to be made under guaranty on work done during the year if the average cost of such repairs or replacements can be estimated with reasonable accuracy. The balance in the reserve account at the close of each taxable year must be adjusted to reflect the estimated liability of the roadbuilder with respect to outstanding guaranties. The roadbuilder might also set up, in appropriate cases, reserves for renegot-

### **Better Tax Planning Means Better Profits**

Just as the road builder must keep abreast of new construction methods and new construction machinery, he must also keep abreast of current changes and trends in taxation, so that he may keep as large a share of his profits as is permitted by law. The failure to consider tax consequences of all business transactions before entering into them can be as costly as failure to estimate a job properly or performing a contract in a haphazard manner. Tax planning is as important a function of the modern business man as is selling and production. Alert tax planning can keep profits from turning into disastrous losses.

Effective tax planning can also increase your take-home net profits, as the tax consequences of a business transaction will depend not only on what is done but on how it is done.

## Sale of Salvage Materials as Capital Gains

A recent court decision involving roadbuilding contractors in Michigan points the way for others, to realize capital gains on the sale of waste and salvage materials in certain instances.

The roadbuilders, in performing a contract involving the removal of a railroad fill, were required to remove "pea gravel" which had been used in the construction of the fill. Since the gravel was useful for making fills, driveways, roadways and the construction of sewer trenches, the roadbuilders preserved the "pea gravel" in a separate pile. The company had also purchased timbers for use on a contract. This timber could be used for the erection of a temporary structure or as supporting timbers. In the performance of another contract the contractors constructed certain piles. In constructing the piles seamless steel tubing was used which became part of the piles. Other seamless steel tubes were used to pour concrete into the tubing which became part of the piling. When the contract was completed the tubing used for pouring concrete was removed. The tubing so removed could be used on a similar construction project.

### Trestle Taken Down

In the performance of a contract to build a railroad grade separation it was necessary for the builder to construct a temporary trestle. Upon completion of the grade separation the trestle was taken down and removed. Firwood ties used in the trestle could also be used for other jobs identical with that on which they had been used or for blocking up buildings and for moving equipment. The builders also purchased I-beams which were used as equipment on a

grade separation job. In addition, they were also used as equipment on various other construction jobs. On one occasion they were used for supporting false work for a concrete bridge. They could also be used to move cranes, brace sewer trenches, and construct temporary bridges.

The roadbuilders sold all this salvage material at various times during the year. The cost of all the materials had previously been charged to the various construction jobs on which they had been used. The roadbuilders treated the profits from these sales as capital gains on their tax returns. The internal revenue service maintained that the profits were, taxable as ordinary income from the conduct of a trade or business.

In deciding the issue, the Tax Court made certain distinctions in the nature of each of the salvaged items and held that some of the gain was ordinary income and some was eligible for the more favorable capital gains treatment.

These distinctions thus established should guide your actions in treating salvage materials so that you can get the desired long-term capital gain benefits.

The proceeds of the sale of "pea gravel" were held to be fully taxable as ordinary income. The court record failed to show any specific purpose for which the gravel had been preserved in a separate pile. Since it was obviously useful for construction work, the court concluded that it was held for potential integration in completed jobs, and as such was kept by the contractors for sale to customers in the ordinary course of its trade or business and therefore was not a capital asset.

As to the steel tubing, hardwood

timbers and wood ties, there was no evidence to prove that these items were actually used again in the business subsequent to the time they were salvaged from their original jobs, and before they were sold. The court decided that these materials were also supplies which could be integrated into new work and likewise constituted property held primarily for sale to customers in the ordinary course of business. Thus the proceeds of the sales of these were fully taxable as ordinary income.

### Beams Capital Assets

The steel I-beams had been purchased as equipment. The beams were actually retained as equipment and used as such. They were therefore capital assets and not inventory held for sale to customers. Even though the roadbuilders had not depreciated this asset (they could not as the cost base was zero) the beams were a capital asset and the proceeds of their sale constituted a capital gain taxable at 50% of the regular tax rates.

The clear conclusion is this. If the salvaged property can be consumed in the performance of other contracts, it is considered as inventory held for sale and if sold the proceeds are taxable as ordinary income. On the other hand, if you can show that the salvage or waste materials are used over again as equipment that is not used up or integrated into the new structure or roadway, you can consider them capital assets and obtain the favorable tax treatment that results from the sale of such assets.

The keeping of records to show that salvaged materials were used as equipment can make this natural sideline to the roadbuilder's business doubly profitable taxwise.

tiation of contract price, vacation pay and certain liabilities for self-insured injury and damage claims.

For assets newly acquired or constructed after December 31, 1953, there will be three main methods of computing depreciation.

1. Straight-line depreciation. This is the method commonly in use under the old law.

2. Declining-Balance depreciation. Under this method the depreciation rate is applied to the undepreciated balance of the asset. The old law permitted the use of a depreciation rate equal to 150% of the straight-line rate that could be used for the asset to be depreciated. The new 1954 Code permits a rate equal to 200% of the appropriate straight-line rate. This method yields substantially higher depreciation

deductions in the early years of life of machinery and equipment; however, there will always be an undepreciated balance. This objection is eliminated in the third permissible depreciation method.

3. Sum-of-the-digits depreciation. This is a variation of the declining-balance method that also yields high depreciation deductions in the early years of the life of a piece of equipment. If a machine has a useful life of, for example, ten years the numbers 10-9-8-7-6-5-4-3-2-1 are added to total 55. In the first year 10/55 of the value of the asset may be taken as a depreciation deduction. In the following years 9/55, 8/55, 7/55, etc. are taken as deductions.

The straight-line method will depreciate 50% of the cost of an asset

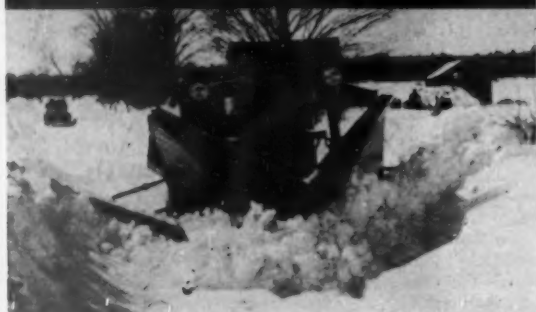
in the first half of its useful life. The declining-balance method will depreciate 62%, and the sum-of-the-digits method will depreciate 73% of the cost of an asset in the first half of its useful life.

No special election is required to change over to a different method of depreciation for any new piece of equipment or building. The method used on the first tax return after the asset is acquired or built is the one that must be followed in subsequent years. The same method of depreciation need not be followed for all the assets owned. The declining-balance or sum-of-the-digits method is permissible only for assets having a useful life of at least three years.

The new liberalized depreciation has a twofold advantage. The pri-



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## Contractors' Tax Planning (Cont.)

major advantage is the higher depreciation deduction available in each of the early years of the asset's life. An important additional benefit occurs if equipment is traded for new equipment. When a piece of equipment is traded for similar new equipment, the depreciated balance of the cost of the old equipment is added to the price paid for the new equipment to form the basis for depreciation of the new equipment. If the trade-in allowance on the old equipment is greater than the depreciated cost of the old equipment, a tax advantage results if the old asset is sold to the dealer for the trade-in-price, and the full price paid for the new equipment. The gain realized on the sale of the old equipment would be a long-term capital gain taxed at not more than 28%. However, the cost basis for depreciation of the new asset would include this taxed gain. The depreciation on this amount would, of course, be deductible at the regular tax rates. The tax savings for roadbuilders with a substantial turnover in equipment each year can well be very substantial.

### Interest, Carrying Charges

Under the old law you could not deduct carrying charges on installment purchases of equipment if the amount of interest was not stated separately. The entire cost, including the carrying charge, had to be capitalized and the cost could only be recovered by depreciation. You may now deduct the portion of the finance charge, service charge or other carrying charge to the extent of 6% of the unpaid balances under the installment contract at the beginning of each month beginning in the taxable year, divided by 12. The portion of the carrying charge deductible as interest cannot exceed the total carrying charges that should be allocated to the taxable year. Use of this



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provision of the law will give a larger current deduction, normally, than the amount that would ordinarily be deductible as part of the depreciation of the asset.

### Accounting for Long Term Contracts

The new Internal Revenue Code of 1954 did not make any changes in the tax provisions concerning contracts which require over 12 months to complete. The cash accrual, percentage of completion, or completed contract method of accounting may still be used. The procedures for obtaining permission for use of the special accounting methods for long-term contracts have not been changed. It is still necessary to request permission to use the completed contract method or percentage-of-completion method within 90 days after the beginning of your fiscal year.

### Corporation vs. Partnership

A new provision of the tax law permits certain individual proprietorships and partnerships to elect to be taxed as corporations. To qualify for this treatment you must meet the following qualifications: (1) the business must be owned by an individual or not more than 50 partners, (2) no proprietor or partner can have a 10% interest in more than one enterprise taking advantage of this section, (3) no partner or proprietor can be a non-resident alien or a foreign partnership, and (4) capital must be a material income producing factor. Once an individual or partnership elects to be taxed as a corporation it cannot revoke its election. In order for the new provisions to apply, the proprietor or all partners must make an election not later than 60 days after the close of the taxable year. The purpose of this provision is to permit a business to select the form of organization which is most suitable to its operations without being influenced by Federal income tax considerations.

In considering the form in which the road contractor should do business, consideration should be given to the possible risk of damage claims in excess of insurance coverage. Large negligence awards may be collected from the partners if partnership assets are insufficient to meet the claims.

Consideration should be given to the advisability of separating the functions of the contractor into more than one business. The fixed assets and equipment of the contractor can be owned personally or by a partnership and the operating company can be owned by a corporation. The proprietor or partnership can then rent or lease the equipment to the operating corporation. This will protect the major investment of the contractor from the business risks of the operating organization.

In deciding whether to operate as a corporation as opposed to an individual proprietorship or a partnership,

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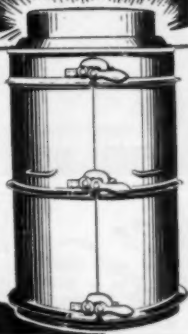
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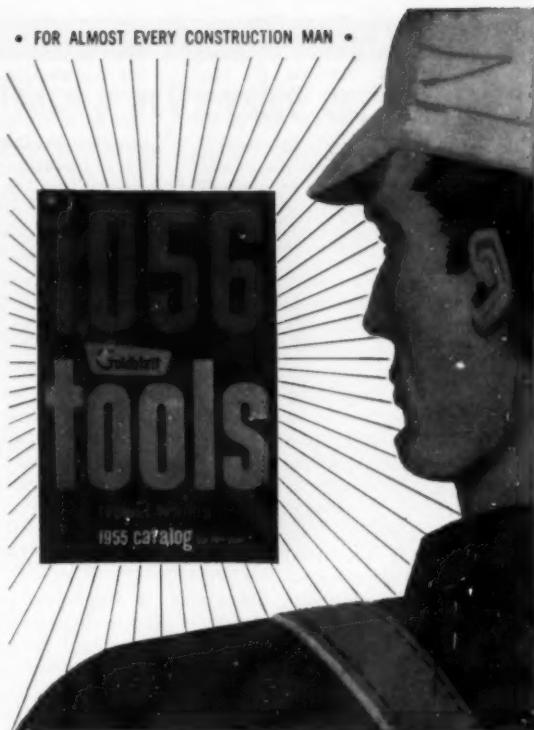
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## Contractor's Tax Planning

the relative tax burdens of each should be considered. The corporation normal tax rate is now 30% on the first \$25,000 of taxable net income. For taxable years beginning after April 1, 1955, the normal tax rate will be reduced to 25%. The corporation surtax is 22% on the net income in excess of \$25,000.

A married partner or individual can earn only \$18,000 before his effective tax rate exceeds 25%. Therefore if each partner's share will be under \$18,000 (\$9,000 for an unmarried partner) partnership form will be cheaper taxwise than a corporation. On the other hand if the corporation earns net income greatly in excess of \$25,000, then if the partner's share would be less than approximately \$40,000 (\$80,000 in the case of a married owner) the unincorporated form of doing business would be more economical. Upon estimating the relative advantages of one or another form of doing business, you must take into consideration your taxable income from all other sources, inasmuch as your business income would be accumulated on top of such other income.

In addition to the income tax of

the corporation, you must also consider the additional income tax to you as a stockholder when your corporation declares dividends or when the corporation is liquidated. In making the decision as to the form of a new enterprise, careful projection of future income should be made in order to determine the most desirable form of organization. Non-tax considerations should be kept in mind at all times in making your decision.

**EDITOR'S NOTE:** The above tax article has been written by Harry W. Wolkstein, Lecturer and Author on Government and Taxation, a recognized tax specialist in the construction industry, and senior member of his firm Harry W. Wolkstein & Co., certified public accountants of Newark and Asbury Park, New Jersey.

• Aggregates purchased by the Virginia department of highways in the last fiscal year (1953-54) amounted to 1,758,846 tons from commercial sources. Another 513,081 tons was produced by the state. Contractor-furnished aggregates brings the year's total road tonnage to more than 4,000,000.

## Meetings Ahead

**SIXTH ANNUAL SYMPOSIUM ON GEOLOGY, AS APPLIED TO HIGHWAY ENGINEERING** — Johns Hopkins U. and Maryland State Roads Commission, Johns Hopkins U., Remsen Hall, Baltimore, Md.; Feb. 18.

**AMERICAN CONCRETE INSTITUTE** — Annual convention, Schroeder Hotel, Milwaukee, Wis., Feb. 21-24.

**41ST ILLINOIS CONFERENCE ON HIGHWAY ENGINEERING** — sponsored by U. of Illinois, Department of Civil Engineering, Urbana, Ill.; March 1-3.

**ASSOCIATION OF HIGHWAY OFFICIALS OF NORTH ATLANTIC STATES** — Annual meeting, Traymore Hotel, Atlantic City, N. J.; March 2-4.

**AMERICAN CONGRESS ON SURVEYING AND MAPPING AND THE AMERICAN SOCIETY OF PHOTOGRAMMETRY** — Annual Meetings, Hotel Shoreham, Washington, D. C.; March 7-11.

**ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC.** — Annual convention, Roosevelt and other Hotels, New Orleans, La.; Mar. 14-17.

**PURDUE UNIVERSITY** — 41ST ANNUAL PURDUE ROAD SCHOOL, Memorial Union Building, Purdue University, Lafayette, Ind.; April 11-14.

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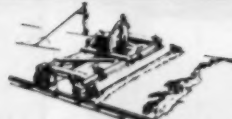
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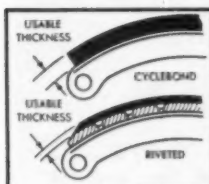
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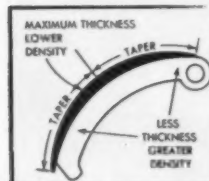
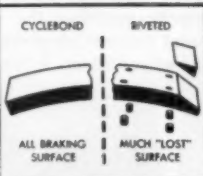


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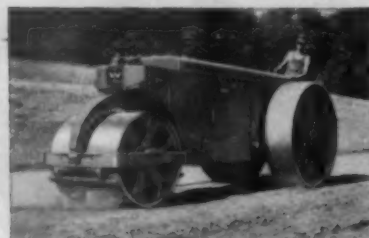
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are designed to do every kind of surface grading job economically, speedily and with a minimum of costly "down time" for blade adjustment on the job. Complete hydraulic cab-controlled movement of the blade from 90° elevation on the one side to 90° on the other, eliminates any manual adjustment. Other features include: extra clearance under high arched front axle; mechanical steering with hydraulic booster; 360° blade rotation without removing scarifier teeth. Power sliding moldboard is optional. Units are diesel powered.



4D-75. Blade control from the cab, with no manual adjustments, permits a complete range of bank sloping positions.



4D-85. Truly multi-purpose, Huber-Warco graders can handle a variety of jobs efficiently and dependably.



4D-115. The Huber-Warco blade handles any ditching need... rough cut, flat bottom, V-cut... wide or narrow.

### HUBER-WARCO Maintainers...

handle efficiently all grader maintenance jobs. With one machine and attachments 10 jobs can be handled. This 42½ horsepower machine performs as a grader, bulldozer, broom, side dozer, lift-loader, road planer, snow plow, berm leveler, patch roller and mower. Owners credit Huber-Warco's blade-pushing design for a THIRD MORE WORK than conventional pulled blades would produce. Hydraulic controls govern movements of the moldboard and all attachments.



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... for more details circle 232, page 12



## Traffic Safety and Control

### Edens parkway accident rate greatly reduced

Much adverse publicity arose in Chicago newspapers recently over the bad accident record on the newly opened Edens expressway northwest of Chicago. A death rate of 10.5 per 100 million vehicle miles was experienced in 1953. This was in sharp con-

trast with the very low rate enjoyed by Calumet Parkway of similar design and construction south of Chicago, both highways being built under the direction of the Cook County highway department.

An analysis is reported to have shown that 85% of the Edens accidents were due to bad driving, and the high rate due in general to a lack of educational work and policing. The annual death rate on Edens has been reduced from 11 fatalities per year to 3 in 1954, or a rate of 1.79 per 100 million vehicle miles. The rate on the Calumet expressway has been reduced meanwhile to less than 1.

### Trucks weighed by new method in N. Carolina

North Carolina's system of truck weight enforcement stations has proven "eminently successful," according to a report by James S. Burch, engineer of statistics and planning for the State Highway and Public Works Commission. In over two years of operation of 10 weighing stations, the frequency of over-weight axle loads has declined almost to the vanishing point.

From the standpoint of truck operators, average gross loads and average payloads are as high as they were before the program was started.

North Carolina has a long-established axle weight limit of 18,000 lb. Prior to 1951, there had been little attention paid to axle overloads, and general enforcement had been at low ebb. The General Assembly then fixed over weight penalties on an ascending scale (instead of fines) and authorized the enforcement stations.

During the first half-year of operation, from 40 to 75 trucks per 1,000 were found in violation. During the last 12 months, the rate was reduced to about 4 per 1,000.

The weight stations were not located at state lines, but well within the State so that their geographical area of influence would be internal. A study was made of truck-use patterns over the entire State, and road sections carrying heavy truck traffic were noted. Segments of routes difficult to by-pass were selected for the stations. Points near river crossings were considered best. Final selections were such that 28 "route points" were intercepted by 10 stations.

The stations are operated on a 24-hour basis by the Department of Motor Vehicles, which handles all enforcement work. The State Highway Commission handles the location, design, construction and maintenance.

### Traffic policing program for New York Thruway

Twenty state police troopers and two dispatchers have been assigned by the New York state police to patrol the new Thruway now open for 386 miles from Buffalo toward New York. Headquarters will be in Albany and Syracuse.

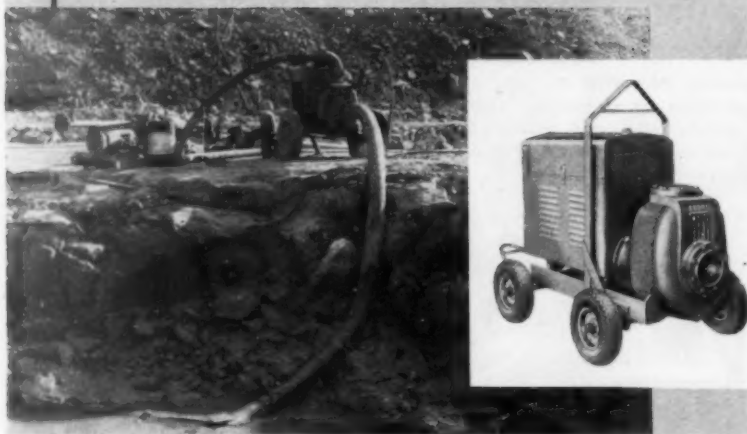
The Thruway Authority is purchasing 57 additional state police cars and will construct 11 barracks at about 50-mile intervals along the route.

The initial policing, involving 24-mile patrol lengths, and 42 cars, will be tightened up with shorter patrol lengths and one car assigned to each lieutenant responsible for its care.

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... for more details circle 165, page 12

## New Publications

**BULLETIN 89: NIGHT VISIBILITY (1954)** — Contains nine papers on the subject presented at the Highway Research Board Meeting held January 12-15, 1954. For copy, address the board at 2101 Constitution Ave., Washington 25, D.C.

**SIDEWALKS AND CURBS.** Standard specifications for public works construction, issued by American Public Works Association, 1313 East 60th Street, Chicago 37, Ill. Price \$1.00. Prepared under the direction of George Snyder, City Engineer, Jackson, Michigan, chairman of APWA committee.

**THE SCIENTIFIC BASIS OF ROAD DESIGN** by F. L. D. Wooltorton; Vol. 14, Roadmaker's Library Series; St. Martin's Press, Inc., 103 Park Avenue, New York 17, N.Y. Price \$12.00. Contains a preface by Hans F. Winterkorn, director of Soil Physics Laboratory, Princeton University, who cites this work as having pioneered in recognition of Pedology and soil science for rational road construction. This book presents and analyzes soil information pertinent to low-cost road construction.

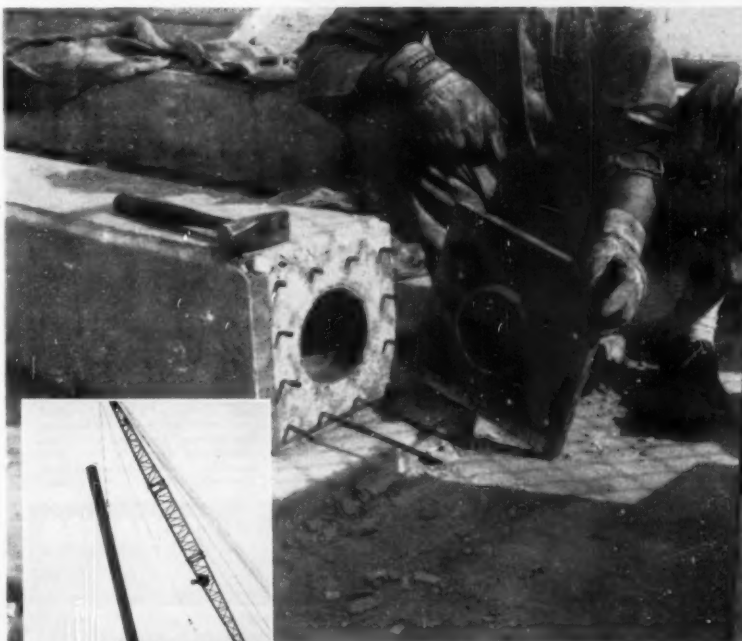
**DISTRIBUTION OF CONCENTRATED LOADS BY LAMINATED TIMBER SLABS.** By W. C. Huntington, Wm. A. Oliver, M. W. Jackson and W. T. Cox-of the civil engineering department, University of Illinois; Engineering Experiment Station Bulletin No. 424; 68 pages. Outlines test program covering 119 slabs, chief conclusion of which is that the important factor in the distribution of concentrated loads among laminations is the type and arrangement of fasteners. Price \$1.00. Experiment station, Urbana, Illinois.

**SYMPOSIUM ON ROAD EQUIPMENT.** Technical Bulletin No. 209, 1954, published by American Road Builders Association, World Center Bldg., Washington 6, D.C. Contains papers presented at annual ARBA meeting in January, 1954, by Harold T. Reishus of International Harvester Company; S. Howard Brown of Brown, Davis and White, contractors; H. A. Radzikowski, U. S. Bureau of Public Roads, Washington, D.C.; M. B. Garber, Thew Shovel Company; Charles W. Smith, Smith Engineering and Construction Company; and C. T. Newton, Chief Engineering Research and Development Division, Office of Chief of Engineers. Price \$1.50 to non-members or \$.75 to members.

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Florida Prestressed Concrete Co., piling and girders  
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AKRON, IND. BRANTFORD, ONT.



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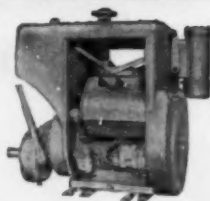
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Model VG4D Wisconsin Heavy-Duty Air-Cooled Engine specified as standard equipment on Seaman Trav-L-Plant. Equipped with Stellite exhaust valves and valve seat inserts and valve rotators for long engine life and minimum servicing.

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This is just another typical power assignment in which Wisconsin Heavy-Duty Air-Cooled Engines play important roles. Construction contractors, equipment designers and builders . . . men who are most familiar with power equipment service demands . . . specify "WISCONSIN ENGINES" as their best guarantee of dependable service and low-cost maintenance.



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Removing Industrial Tractor sprocket with 50 Ton OTC Hydraulic Puller.

OTC 17½ Ton Ram on portable press for shop use.

OTC 100 Ton unit with hoist frame pulling diesel locomotive axle journal bearing.

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... for more details circle 198, page 12

## Personals

ALLISON C. NEFF, vice-president of Armco Drainage & Metal Products Inc., Middletown, Ohio, has been nominated president of the National Society of Professional Engineers. Vice-presidential candidates are: Louis F. Frazza, Hawthorne, New Jersey; Warner Howe, Memphis, Tenn.; Virgil E. Gunlock, Chicago; Garvin H. Dyer, Independence, Mo.; Robert J. Rhinehart, Pine Bluff, Ark.; and L. R. Durkee, Mercer Island, Washington.

CLAIR E. SMITH has been appointed deputy chief engineer, New York State Department of Public Works, Albany, succeeding E. T. CAWKINS who has retired after 43 years of state service.

Mr. Smith has served the department 31 years, succeeding immediately from the post of principal civil engineer, design and plans.

Mr. Cawkins on his retirement was cited by superintendent B. D. Tallamy as having "assisted materially in programming the present system of modern highways and parkways on Long Island." More recently his work was to review all plans for the New York Thruway.

ROSS C. KEELING, state highway engineer, has resigned to become project engineer for Howard-Needles-Tammen & Bergendoff on the Kansas turnpike. W. S. McDaniel, assistant highway engineer, has been appointed acting chief engineer and R. R. Ireland, engineer of traffic services, as acting assistant engineer.

Mr. Keeling has served the Kansas department since 1926, becoming chief engineer in 1941.

MALCOLM S. LORING has been appointed District Engineer of the Boston office of the Portland Cement Association. He succeeds S. E. Votaw who has retired after 20 years with the Association.

CLYDE E. CALDWELL, assistant chief construction engineer of the Minnesota State Highway Department has been appointed construction engineer. He has been with the department since 1921.

EDWARD W. WENDELL has retired as deputy chief engineer, New York State Department of Public Works. He was in charge of bridges, grade separations and structures, and one of the leading authorities on highway bridge engineering. He has served the state for 46 years.



When figuring  
earthmoving  
costs...

THE No. 12  
GOES ON THE  
CREDIT SIDE



The Caterpillar No. 12 Motor Grader is a big, versatile machine that always is entered on the credit side of ledger books. Particularly when you figure earthmoving costs.

Knutson-Gould Construction Co. of Kansas City, Mo., knew that when it began hauling fill for the approach to the Missouri Bridge at Jefferson City. Here, you see its CAT\* No. 12 Motor Grader as the cost-cutting member of a team of equipment moving 260,000 yards of loess and clay.

The No. 12 is maintaining the haul road. By so doing, it is wringing the last cent of economy out of the big tractor-scraper teams. They can haul their maximum capacity at the highest possible speed. The D7 and D8 pusher Tractors are not called away from the borrow pit to help rescue mired-down equipment.

And down time costs are slashed because the road is an *aid* to the tractor-scrapers, not a torture trail that causes breakdowns.

Your Caterpillar Dealer will be glad to show you the No. 12, No. 112 and the No. 212 Motor Graders at work on your job. Have him demonstrate the reasons successful contractors always put Cat Motor Graders on the credit side when they figure earthmoving costs.

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Two big items in bridge reconstruction—new floors and traffic rails—are effectively and economically supplied with this tried and proved "team."

USF Structural-Plate Bridge Flooring is a deep box corrugated steel floor section that ideally replaces worn plank floors with an all-steel foundation for bituminous surfacing. It reaches you prefabricated to your roadway width, ready to place and weld directly to the floor stringers. No special handling equipment is required.

Other member of the team—USF Barrier-Beam Guard Rail, is a beam type section that is thoroughly adaptable to bridge rail service. Its narrow section requires only 3" of roadway width and its high strength and deflection properties permit its direct mounting to bridge structure without use of spring mounts.

Use the USF "team" together on your next bridge reconstruction. Get fast, low cost floor replacement and complete structure protection without sacrifice of roadway.



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... for more details circle 213, page 12



GALE MOSS, highway director in Kansas, has left that position to become general manager of the Kansas Turnpike Authority. He has been succeeded by E. R. Caskey of Pittsburgh. Kansas, who has been a member of the Highway Commission.

J. CARL McMONAGLE, Director of Planning and Traffic Division, Michigan State Highway Department, has been elected national Secretary-Treasurer of the Institute of Traffic Engineers.

PAUL B. LEE, 54, former Chief, Pavements and Railroads Branch Engineer Section, Headquarters Sixth Army, Presidio of San Francisco, California, died October 1, 1954. Mr. Lee was Principal Engineer at Luke Air Force Base, Arizona, during the early part of World War II. Previously he was District Engineer of Maintenance for the Missouri Department of Highways at Joplin.

TOM HUMPHRIES, veteran employee of the Michigan state highway department, died recently. He was head of field supervision on bituminous construction work for the department.

DAN B. MILLER, 68, Managing Engineer of the Pacific Coast Division of The Asphalt Institute in San Francisco from 1931 until his retirement in 1947, died at his home in Palo Alto, California, on October 23, 1954, after a long illness. He is survived by his wife Thelma.

Mr. Miller was widely known for his engineering, educational, and research activities in the asphalt field and contributed much to the development of asphalt pavements for highways and streets. He was affiliated with many professional engineering societies, and a registered civil engineer in the State of California.

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# *Bituminous* **ROADS AND STREETS**



*Published by Gillette Publishing Company  
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#### Cover Scene

Compacting asphaltic concrete for a resurfacing job, Union County (N.J.) road department. Gulton 3-wheel roller and Adams paver shown.

**Tar-Rubber Hot Mix for Jet Fuel Resistance**  
**An Approach to Better Rolling**  
**Pavement Tester Checks Load Effect**  
**What's New in Equipment and Materials**

**FEBRUARY 1955**



- New MADSEN Model 440 Twin-Shaft Pug Mill Mixer (Patent Pending) with improved mixing action, faster discharge, built-in oversize capacity and precision-ground, externally removable sectional liners.

- Exclusive bin design (Patent Pending) which eliminates segregation, provides uniform aggregate withdrawal, and promotes improved aggregate distribution in the weigh-box.

- All air-operation of bin gates, asphalt pressure injection and mixer gate which reduces operator fatigue with resultant increase in tonnage. Air operation is faster, more accurate, decreasing time cycle from bin to truck.

**NO OTHER ASPHALT PLANT  
IN THE INDUSTRY  
GIVES YOU SO MANY  
OUTSTANDING  
FEATURES**

- In-built duct work to relieve pressure on mixer weigh-box housings, bin, hot elevator and screen housings to draw off vapors, moisture and dust.



- Oversize capacity weigh-box with air-operated gate, 4-point lever suspension, roller-mounted so that it may be quickly rolled out of the way for field maintenance.

- Location of operator station on end of plant which provides unobstructed view of in-coming and out-going trucks... away from fumes and heat.

More than 25 big features are incorporated in the MADSEN Model 481 Asphalt Plant... features that give the contractor a faster charge-mix-discharge cycle, easier accessibility, less maintenance and more productive capacity than can be found in any other asphalt plant of its type. Plant is available in 4000-lb., 5000-lb. and 6000-lb. capacities.



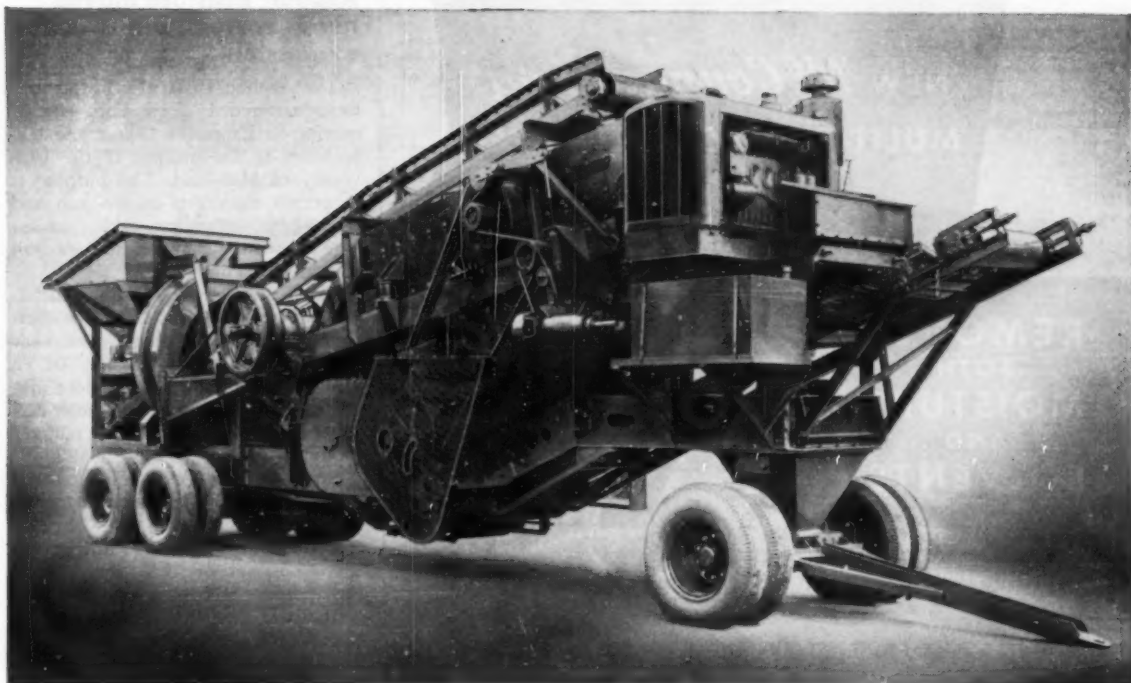
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... for more details circle 196, page 12



## Why this new ultra-modern in-line plant was developed

● Here it is . . . a gravel plant with a 1036 jaw crusher, 30" x 24" rolls, and a big 4'x12'-2½ deck vibrating screen, — yet which weighs only 55,900 lbs. on the road . . . a plant equipped with the most efficient mechanical drives ever devised for a portable plant . . . a plant which can be moved without dismantling!

In the past, highway load limits have been met in one of two ways . . . either by reducing the size of crushers, screens, and other units in order to save weight . . . or by dividing the plant into individually mounted primary and secondary plants.

In one case, capacity was sacrificed. In the other, portability was lost, cost was higher, and longer set-up time was needed at the pit.

**Specially designed crushers, screens**  
To create the new 35-S, PIONEER engineers began by redesigning its basic units. They developed a new angle of tilt for the jaw crusher to improve feeding of oversize and make adjustment easier. The 1036 crusher, incidentally, is the largest used in . . . for more details circle 228, page 12

any portable duplex gravel plant.

The specially designed 30" x 24" roll crusher is hydraulically adjusted and gives 1½ more crushing area. A new-type 4'x12'-2½ deck vibrating screen and 30" conveyors, are as large as you'll find on any plant of comparable weight and cost.

### Efficient drive is developed

V-belts and a minimum of high-speed steel roller chains drive the entire plant, except for one fully enclosed right-angle drive.

For quick moves, it's seldom necessary to dismantle feeder hopper, feeder, sand conveyor, or power unit. Just pull into a new pit, start the power, and go to work!

The 35-S is designed for long life with a minimum of down-time. On the rare occasions when maintenance is necessary, parts are easy-to-reach and easy-to-repair.

If you're considering a project in which extra portability and low cost production will prove an advantage, it will pay you to investigate this revolutionary new plant. You'll be surprised at its low cost, as well as the competitive advantages it will give you.

For more details, write to Pioneer Engineering Works, Inc., Minneapolis 13, Minnesota (subsidiary of Poor & Company, Chicago).

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Total weight	55,900 lbs.*
Weight front end	22,800 lbs.*
Weight rear end	33,100 lbs.
Power required	130-150 HP continuous at 900 RPM output shaft speed for on-plant, 900-1200 RPM output shaft speed for off-plant.

\*Weight with semi-hitch. For single axle dolly, add 2200 lbs.

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## NEW McConnaughay MULTI-PUG ASPHALT MIXER

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BOTH  
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HTD-500



## Prepares Hot or Cold Bituminous Mixtures — ¼ Ton Capacity

Designed for economy of operation in the production of bituminous paving mixtures, this new McConnaughay HTD-500 Mixer is large enough (¼ ton capacity) for many resurfacing jobs as well as all types of pavement patching. Working on location, it provides the exact amount of material needed; never too much or too little. It has a low pressure burner directed into the mixing and heating unit through a combustion chamber. This HTD-500 and all McConnaughay HTD models are the only mixers which effectively remove both moisture and solvents from bituminous mixtures . . . giving you positive assurance that



McConnaughay HTD-500 at work on street patching job in Cheyenne, Wyoming.

patches and resurfaced areas will set up hard as soon as the applied mixture cools. Write, wire or 'phone for details and specifications today.

**K. E. MCCONNAUGHAY**  
LAFAYETTE 2, INDIANA

. . . for more details circle 195, page 12

## Asphalt Institute moves headquarters, plans expansion

The Asphalt Institute, heretofore headquartered in New York city, is moving its Executive Offices and laboratories to the campus of the University of Maryland. The purpose is to permit expansion of research and engineering operations, taking advantage of facilities that are more modern and greatly enlarged.

The Institute's new national headquarters will be located on the University campus at College Park, near the outskirts of Washington, D. C. Thus it will be more convenient also to the many government agencies and other interested groups in the nation's capital.

President J. E. Buchanan reported: "After 35 years with headquarters in New York, the move to Maryland represents a major change in Institute operations, and one with the promise of handsome returns in efficiency, research and development, improved liaison and general effectiveness.

"With respect to research and development, not only will the Institute have modern and greatly enlarged facilities, but also it will have about four acres of ground for outside testing, something not possible under the operating conditions in New York.

"Moreover, the Institute will work in concert with University of Maryland laboratories, libraries, and the engineering faculty, with faculty privileges extended to the Institute."

Buchanan said the Institute staff at College Park is being expanded to enable it to move full-speed ahead with its enlarged research program.

Concurrent with the transfer of national headquarters to College Park, Buchanan said the Institute's Division Office in Washington will be closed and a new Division Office will be opened in New York City. The latter will be located at 1270 Avenue of the Americas, after January 1, with Herbert Spencer in charge, who currently is District Engineer for the New York-New Jersey metropolitan area. This office will be known as the Atlantic-Gulf Division office.

New York personnel moving to College Park, in addition to President Buchanan, include A. S. Wellborn, chief engineer; J. M. Griffith, engineer of research; R. C. Dresser, acting director of the department of information; C. A. Mayer, office engineer, and J. E. Hittle, assistant engineer of research. G. H. Dent, who had been serving as Division Engineer in Washington, will join the College Park staff as assistant chief engineer.



## VIEWS AND COMMENTS

By H. G. Nevitt

### Moisture Control—A Problem for Analysis

**I**N our original introductory comments to this series of discussions of bituminous surfacing fundamentals, we remarked that the need for considering drainage was continually being impressed upon the highway engineer. Any type of highway construction involves consideration of moisture; decisions concerning it are basic. This matter cannot be too much or too frequently discussed. It has particular application to bituminous construction. Water control has correspondingly received much mention from us and will undoubtedly continue to be noticed in the future. However, in discussing the problems presented by moisture we hope to occasionally bring in some new point, and perhaps also to present considerations which will afford further justification for its mention.

In brief, the proper control of water is fundamental, therefore, it belongs in this series. Actually, it has two aspects with bituminous surfacing. One covers the problems arising from water in the mat; the other from water below—that is, in the base and sub-grade. We will touch briefly on the highlights of each.

#### Water in the Mat

It would seem almost obvious that water must not be an appreciable ingredient of any bituminous mix or mat. This is true regardless of the source of the water—that is, whether it was specifically included (as in an emulsion) or for easy mixing (as in soil stabilization); whether it was permitted to remain in the materials to avoid excessive drying, or whether it entered later by some type of infiltration.

The reasons for limiting moisture are definite. In a proper design there is little room for any other liquid than the cementing binder. And certainly (although it is sometimes done) we should not leave out some of the needed asphalt simply because the water present, plus the asphalt, gives an excess liquid volume or an over-rich appearance to the mat. In due course this water will leave, and the resulting asphalt films will then be too thick for proper mat action.

Another reason is water affects these films. Such effects will depend upon the exact location of the water with respect to the asphalt layer, but in every case moisture induced effects tend to jeopardize normal film action. With stripping aggregates any moisture in the mat accentuates problems from this source. Then water in the mat is likely to be a very effective weathering agent. It has an appreciable content of oxygen. In addition to dissolved oxygen in immediate contact with the asphalt films throughout the mix, there are likely to be salts or other agents in the water which similarly tend to bring about chemical action and cause weathering of the asphalt.

Fortunately, we can control the quantity of such water. The proper steps to do this depend upon the source of the moisture, either present or likely to be; they require specific analysis and specific cures. We hope sometime to prepare a paper on this subject—one which may seem elementary to the experienced bituminous engineer, but which is definitely needed in certain areas, as any widespread inspection of bituminous construction during the working season will confirm.

#### Reasonable Control

While we stated this water in the mat must be limited, the controls must be reasonable and consistent with the economics and local conditions. The presence of some water is inescapable in practice. It is often impossible, and usually unreasonable, to expect completely dry aggregates. There are other reasons for permitting some moisture to be present in the mat when first laid down. Within limitations, this water will not cause trouble and will in due course escape; therefore, our attempts at moisture control must be sensible rather than aimed at the impracticable. Specification limits should be both realistic and logical. Water that clearly causes harm if permitted in the mat needs elimination, but reducing to below this amount is not warranted, particularly if the cost of doing so becomes unreasonably high.

Arbitrary specifications for moisture control which do not take cognizance of the particular job conditions almost inevitably increase the job cost and in some cases they may even add to, rather than diminish, the troubles encountered. This point may be summed up by the generally applicable statement that water need only be dangerous when it is ignored or improperly controlled. Such controls must be looked on as a routine part of bituminous construction. And all engaged in it should be thoroughly conversant with the numerous ways in which water can cause difficulty and how to take care of them.

#### Water in the Base

The amount of water present in the base must also be considered and usually controlled. Moisture is a natural and almost inevitable ingredient of the subgrade and the foundation course. It is likely to come in from below by capillarity, from adjacent soil masses of higher elevation as a result of the hydraulic gradient they bring about, or as surface water through the mat, shoulders, or side slopes. The control should recognize the possible origins of the water together with the other specific factors in the local situation. As in almost all other phases of highway engineering, blanket procedures do not suit economical water control.

It has seemed to us that the water problem is not always approached on a rational basis. This should recognize all the many factors in the picture, then select one of the three basic methods of water control. In the first of these, the assumption is made that water cannot be prevented from permeating the supporting layers, so that the design adopted must suit their bearing power in the equilibrium condition. The second assumes that by proper means the water can be prevented from reaching the base, or at least from exceeding some known extent or condition. This means that the water must be intercepted in some fashion. Capillary water can be taken care of by a so-called insulating layer which provides a break in the capillarity, or through the presence of a

moisture-impervious membrane or layer for the entry of water on tops and sides can be prevented by such membranes or waterproofing layers.

Whatever the approach, a limiting water content is assumed and means taken to assure this content; and the design consequently based on the material properties at this content.

The third basic method of controlling water is by disseminating it previous to its entry into critical areas. One means of doing this is by its diversion through drains or other similarly functioning installations. It should be noted that this method may not work with capillary soils. The other method of disseminating water

is by preventive evaporation, essentially the taking away of the water that tends to move into the base before it can reach it — or, at least, reach a sufficiently high content to cause damage. A slight modification of this is through the elimination of the water from the base (ordinarily by evaporation through the road surface) as fast as it enters. This latter course is less desirable, since it implies an uncertain condition of dynamic equilibrium, likewise a porous base and top.

Preventive evaporation deserves more than casual mention. Where applicable it is a very practical approach. It requires a normally high

evaporation rate along with limited duration of high moisture conditions.

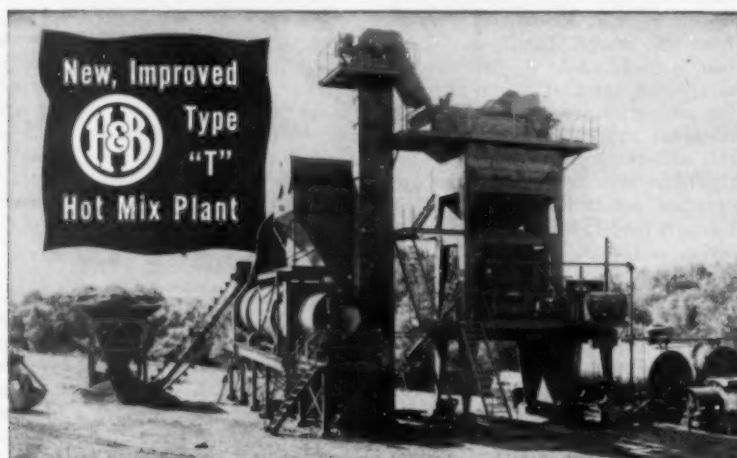
There are numerous areas of this country in which these criteria apply but they must be applied correctly. Some positive control of the entering water is required since the evaporation possible is limited. Normally, this means that the hydraulic gradient under the mat must be held at a quite low level by the use of sufficiently deep ditches, particularly in side-hill work where there is a definite tendency for a high hydraulic gradient on the uphill side. Likewise it calls for a sufficient evaporative area, usually through low slopes on the shoulders adjacent to these deep ditches.

We believe that this method of water control should be widely used in suitable areas, but it is mandatory that control should be on a rational basis. Often standard designs are followed blindly in all locations because they have given general satisfaction in the majority of situations. The real need is for analysis of the conditions with assurance that the standards are sufficient. And these standards should not be unnecessarily expensive just because a few places demand this.

While we naturally approve of standardized designs, we think they can be too much relied upon, with resultant troubles as mentioned above — either excessive requirements or occasional failures where their provisions are inadequate. The specific analysis suggested should cover all the possible methods of water control. Too often one or two approaches become popular in an area, with little attention paid to the possibilities of others in locations favorable to them. Obviously the final decision as to the method of control followed should be determined by comparison, with the selection usually made on economic grounds.

Another comment seeming likewise warranted is that more fundamental studies are needed in some of these approaches, so that the controlling phenomena or facts can be more accurately determined or better known.

We also think our readers will agree that some of the methods listed have not yet received as wide a trial as the possibilities inherent in them seem to deserve. For example, we have previously commented on the possibilities of asphalt membrane protection through which the soil is held in an equilibrium condition. We expect that, in the great majority of cases, this equilibrium will be found to correspond to a very satisfactory supporting power, with consequent economy in the foundation course or other structure involved.



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... for more details circle 244, page 12

# An Approach to Better Rolling

By H. D. Hester

Materials Engineer I, North Carolina State Highway  
and Public Works Commission, Raleigh

*Desirable rolling procedures and equipment for bituminous pavements are discussed here by an engineer whose organization has undertaken basic research on the relationship between rolling methods and pavement quality*

IN RECENT YEARS much consideration has been given to the laboratory design of bituminous paving mixtures and to ways and means of duplicating these mixes at the mixing plants in the field. Much has been accomplished in this direction and the prospects for the production of bituminous paving mixes of superior quality have never been better. Modern mix design and close control of plant mixing, however, are only two of the major phases in obtaining the high type of highway construction which modern highway traffic loads demand.

Careful spreading and adequate compaction on the road of these carefully prepared materials are also very important operations in the construction of satisfactory and dependable bituminous pavements. Spreading bituminous materials on the road has always been watched very closely; perhaps, because any serious irregularity that might occur in the operation is always obvious and easily detected.

## Detecting Poor Compaction

But recognizing poor compaction is not quite so simple. Too often this construction deficiency is not detected until after traffic has started surface deformation, which is certain to follow when maximum consolidation has not been reached during construction. Therefore, it is this compaction phase of bituminous highway construction that must be given very serious consideration if maximum benefits are to be realized from good materials and modern paving mix design.

There are two means of compacting bituminous pavements today: the tamping and vibrating action of the spreading unit on the hot mix and the use of rollers designed especially for the purpose.

The degree of compaction which the paving materials received during the spreading operation is not known, but it is believed to be considerable and proportionate to the forward

speed of the spreading unit, the temperature of the mix, and the thickness of the layer being spread. Since the compactive effectiveness of the spreading unit is unknown therefore how much compactive effort to require of the rolling equipment is also unknown. However, knowing the degree of consolidation is dependent on the amount of compactive effort applied by the rolling equipment while the paving material is within the optimum rolling temperature range.

There are two phases of the rolling operation: the sealing or initial roll and the final or finishing roll. Each of these phases has a definite optimum temperature range within which it may be most effectively performed and, in both cases these ranges depend on the type of mix, the thickness of the course, the kind of base upon which the material has been spread, and the unit bearing value of the roller used.

Probably the ideal seal for a bituminous surface course is one of few sur-

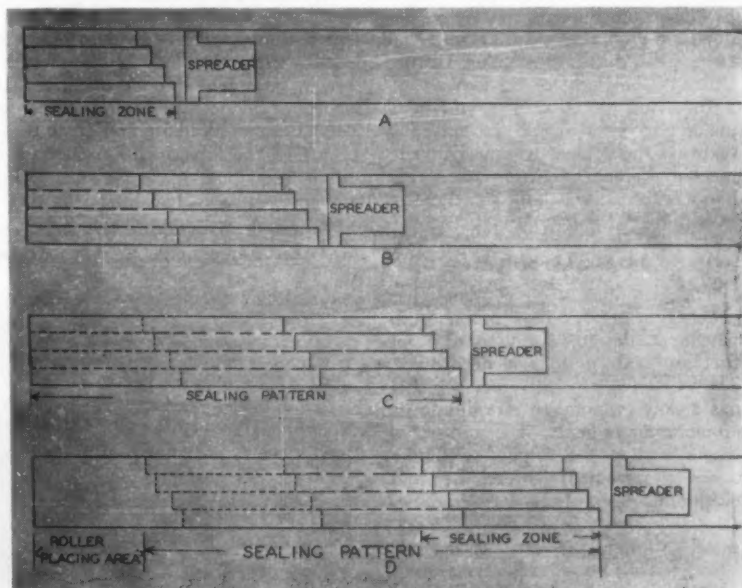
face voids. In order that surface voids may be held to a minimum the sealing rolling must be done while the exposed surface of the mix is very plastic and compressible or before chilling has taken place. In cool weather the hot mix is more sensitive to temperature change and therefore requires earlier sealing. It may require sealing immediately behind the spreader before the unexposed portion of the material has reached the optimum sealing temperature range.

It has been found that a roller with a unit bearing value of 200 lb. per in. width of tread will do a very satisfactory sealing job under most conditions. This is especially true where the thickness of the spread is 1½ in. or more and the maximum size of the aggregate does not exceed ¾ in.

A thoroughly sealed surface reduces the possibility of percolation of water to a minimum and adds considerably to the over-all density of the pavement. Density is very important in the surfacing of any pavement, especially when a hot plant mix is placed on an unprimed soil type base. This is a case where a roller with a relatively low bearing value, following as closely as possible to the spreader, is in most demand for the sealing operation.

With the opposite condition when the spread is less than 1½ in., and on a relatively rigid base, a heavier type

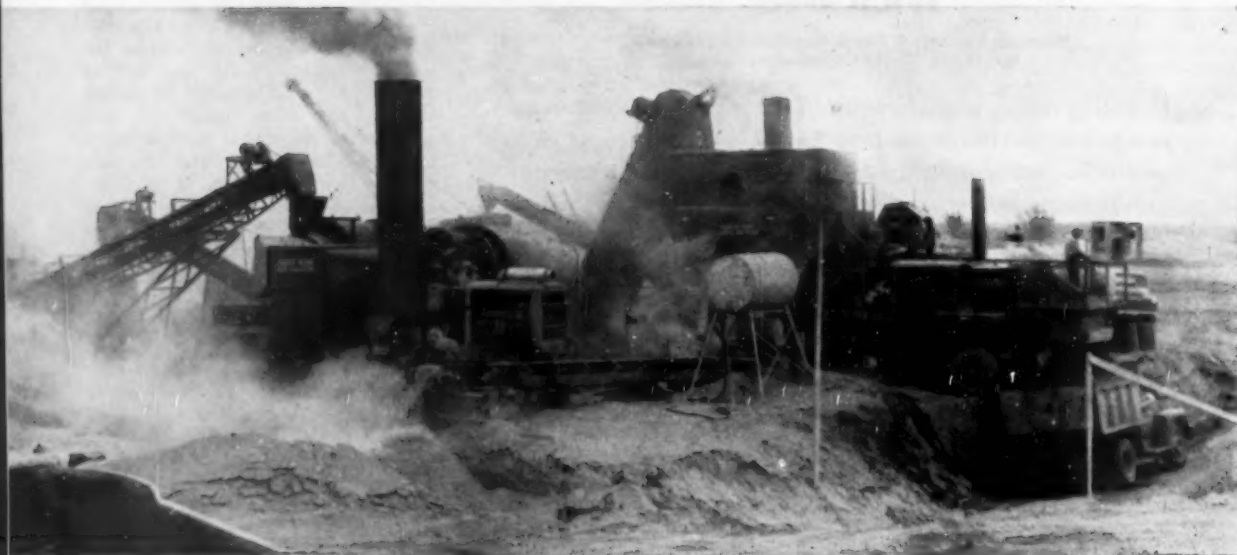
(Continued on page 96)



● Roller sequence in accordance with author's recommendations.



# Tar-Rubber Hot Mix Designed for Jet



● Pioneer hot plant layout on the tar-rubber paving job.

## Big capacity hot-mix plant helps expedite new type of experimental paving at Williams Air Force Base

AT Williams Air Force Base near Chandler, Arizona, where the U. S. Air Force trains many of its jet pilots, a new type of plant-mix pavement has been placed to help solve the problem of jet-fuel spillage. B. L. Gustafson, Phoenix contractor, has done the work under a \$200,000 contract with the Los Angeles District Office of the Corps of Engineers.

Involving 105,000 sq. yd. in a major parking area and a connecting taxiway, the project was designed to meet a problem recurring since Williams AFB first was built shortly after World War II.

### Jet Fuel Problem

The introduction of jet planes has ushered in serious new problems in pavement design. Gasoline and jet fuel are both petroleum derivatives. They dissolve asphalt. Since jet fuel has a slow evaporation rate due to its aromatic ingredients, it can dissolve whole sections of a good asphaltic concrete pavement before the fuel evaporates.

- Rubber-tire rollers, used on the surface of the pavement after it was compacted by steel-wheels, improved surface texture and density.

Tar-rubber flexible pavement is being developed as an answer to the problem. Tar is a relatively low-cost material, and is practically impervious to the solvating action of jet fuels. By combining coal tar and special oil resistant synthetic rubbers to overcome the tendency of tar to crack in cold weather and flow in warm weather, a new type binder material has been developed by two manufacturers: Pioneer Flintkote and U. S. Rubber Co. The job which Gustafson has done used both materials split about evenly as to area covered.

The new material has been used on five Air Force fields to date. Theo-

retically it poses no new problems in conventional hot plant operations. Gustafson and his men, however, approached the Corps of Engineers assignment with more than usual care. One of the company's first steps was to arrange for Arizona Refining Co. of Phoenix — a specialist in handling hot materials — to take care of the tar-rubber bitumen from its railroad unloading point in Phoenix to the job site 35 miles southeast.

The new tar-rubber mix was specified for an area constructed originally in 1951. At that time grading was done, and two lifts of special granular base were laid. These consisted of 6 in. of aggregate base course and 9 in. of improved base. A 3-in. asphaltic concrete pavement was then laid. The pavement began to fail rapidly under action of jet aircraft, and a hot sand-asphalt seal was ap-



# Fuel Resistance

plied in 1952. Within two years, maintenance had become excessive, and enough bad spots had developed that Gustafson's crews had to remove and replace about 200 sq. yd. of the old pavement as a part of the contract.

The new tar-rubber has been placed directly over the old asphalt pavement except in the small replaced section, where tar-rubber was used entirely.

## How Fast Pace Maintained

Gustafson picked his best men for the assignment, along with equipment which had proved itself dependable for this general type of work. He brought in a Pioneer Model 101 Continflo hot plant capable of producing 200 tons per hour of asphaltic concrete containing up to 7 per cent moisture. The plant was set up convenient both to the Williams base and to a near-by source of mineral aggregates.

Mineral aggregates used were not different from those used on routine asphaltic work. They were produced by a crushing and screening plant, trucked to the hot-plant site, dumped in three piles, and charged to the bins of the hot plant by a Bucyrus-Erie 22-B clamshell crane.

Not so routine was the handling of the new type bitumen. The hot mix came out of the pugmill loaded with noxious fumes, and a special blower set-up had to be installed on the pugmill platform to protect the plant operator. The tar-rubber mixture tended also to stick in pipelines, pumps, and parts of the plant, and the only way to clear it was to use raw creosote. Heat alone was not sufficient.

Aside from these principal differences, the material handled about the same as asphalt. As long as the lines were cleaned regularly with

creosote, plant production stayed on normal production. Ideal tar-rubber content was set at 8.4 per cent. Mineral filler in the mix consisted of 40% of  $\frac{1}{2}$  to  $\frac{3}{4}$  in., 50% of  $\frac{3}{4}$ -in. minus material, and 10% of a special blend sand.

Extremely accurate injection of the new type bitumen was reported by Corps of Engineers experts because of the precise method the asphalt plant incorporated for gearing bitumen injection directly to rate of aggregate flow.

## Equipment on the Job

A General Motors 130-hp diesel engine drove the pugmill. A 300-hp GM diesel generating set powered auxiliary motors on the screens, dryer, and hot elevating system.

Other equipment used included a Ray oil burner equipped dryer; a Childers C-100 circulating oil heater; a 12,000-gal. storage tank for tar-rubber at the plant; a 6,000-gal. tank for burner fuel; and a 500-gal. tank for light plant fuel. With this set-up, the hot-mix plant turned out an average of 170 tons per hour.

Placing and rolling the mix followed conventional methods. Some fieldmen reported that the tar-rubber mix went down easier than an asphalt mix with heavy grade bitumen. There was some discomfort from the tar-

rubber fumes characteristic of this new material, but otherwise the 2" x 12' lanes were laid without difficulty.

The surface of the old asphalt pavement was prepared for the new type mix by first tearing out and replacing defective pavement. The remaining area was scraped by a tractor-mounted blade to remove the sand-seal coat put on in 1952. The surface was power broomed and tacked with a fog coat (0.05 gal. per sq. yd.) of RS-1 asphalt emulsion before laying the hot-tar-rubber mix.

In order to develop densities equaling the required Marshall stability rating of 1000 or higher, both 10-14 ton steel wheel rolling and pneumatic tire rolling was done. Air tire rolling particularly seemed to improve surface characteristics. Field tests run with jet fuel showed the new material to be as impervious to penetration as portland cement concrete.

## Similar Installation

Along with the five similar installations in such widely separated points as Maine, Georgia, New Mexico and Washington state, the new pavement will be observed carefully under actual jet plane use. Preliminary observations indicate that tar-rubber pavements may be the logical substitute where jet plane requirements need to be met. This and the other early jobs have run slightly higher than engineer's estimates, largely because the new material is unfamiliar to contractor's crews. When more of the material is used and its characteristics become well established, unit prices are expected to drop rapidly.

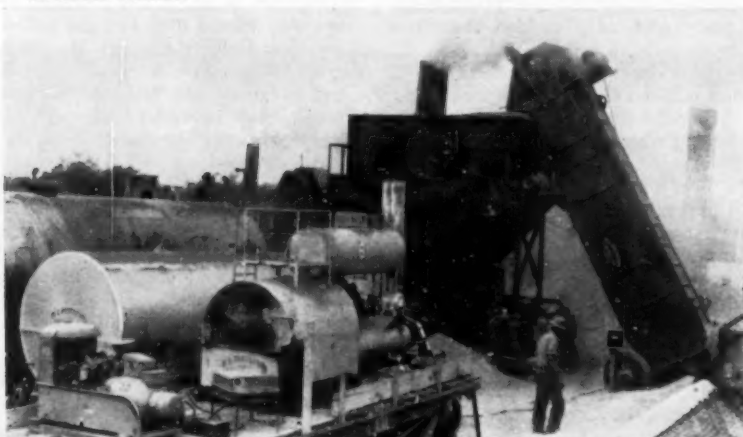
## Personnel

Colonel W. R. Schuler directed the experimental work as District Engineer of the Corps of Engineers Los Angeles office. Field supervision was under W. S. Alldredge and Gene T. Ankrom. Contractor B. L. Gustafson of Phoenix directed his own operations.



● Placing and rolling the tar-rubber mix, designed to resist jet fuel spillage.

- Hot mix plant seen from the cold feed end, showing large heater and asphalt tank capacity. Asphalt tanks were cleaned and used to hold the tar-rubber mixture.





• Vibrations resembling traffic-induced vibrations are set up by this machine, which also utilizes the speed of vibration wave propagation to give an indication of the stiffness of a pavement and base.

## Pavement Tester Checks Load Effect on Roadbed

A PAVEMENT testing device, the work of Shell Oil Co. engineers, was demonstrated recently with co-operation of Bureau of Public Roads engineers at BPR's Roads Research Station near Washington, D. C. Interest of U.S. highway engineers in this apparatus, developed in the Netherlands, centers in its ability to measure the effect of a moving load over an asphalt pavement.

Previously the machine has been used on the Idaho Test Road project, by the Corps of Engineers, and by several state highway departments.

This mobile unit measures stiffness, strain, velocity of vibration waves in pavement, and fatigue patterns. It operates by generating a dynamic force, created by weights revolving on an eccentric shaft. A vertical shaft and rubber-shod base plate transmit the resultant loads to the pavement.

### Better rolling

(Continued from page 93)

roller may be used successfully for the sealing operation and is probably better.

However, in all cases where there are rollers of different bearing values on the job, best results may be obtained by keeping the lighter unit "up front" for the purpose of sealing.

For the sake of uniformity in compaction, a rolling pattern should be established and strictly followed. The sealing pattern should be so fashioned as to cause the material to be sealed within the optimum sealing temperature range thereby eliminating cold joints at the beginning of the area to be sealed. Since the hot material is very sensitive to the weather condi-

Various traffic effects can be simulated by changing eccentric and weights. Load applications on the road surface can range from 20 to 80 psi; load cycles from 5 to 60 per second, the total period of load application being controllable to the brief time that a vehicle wheel is in contact with a given pavement spot.

Electronically actuated recorders pick up from the vibration induced, using an oscillograph. The relation of dynamic load per unit of deflection gives a measure of the pavement stiffness. The rate of wave propagation can be correlated to give a measure of the dynamic shear modulus of the subsoil and base structure in place.

Experience data have made it possible empirically to correlate the test data to actual traffic action on a pavement.

tions, such as air temperature and wind velocity, the speed of the spreader should determine the area of the sealing pattern and also the number of rollers necessary to keep in balance. Increasing the roller speed is never justified except in case of an emergency such as a sudden shower of rain.

After the temperature of the spread has reached the optimum for sealing, the first roller trip should be made. Rolling should begin on the lower outer edge, the roller extending slightly over this edge but not more than 6 in. over. In order that the material may receive as much kneading action as possible the roller on the return trip should follow in the path of the initial forward roll, until it arrives back to the point of the beginning before

moving over preparatory for another sealing trip. This policy should be followed throughout the entire length of the sealing pattern.

Each sealing trip should overlap the path of the preceding trip by at least 15% of the width of the roller. This procedure should be followed until the entire width of the spread has been sealed. The longitudinal distance covered by the roller on the initial trip over the freshly spread material constitutes a sealing zone. The sealing pattern should include the zone to be sealed and the two preceding sealing zones or as the underlying foundation permits.

When a hot lane is spread beside a formerly compacted lane a pavement joint is formed. This joint is a critical point and should be sealed immediately after the spreader has passed.

### Begin Final Rolling

As soon as the temperature of the sealed surfacing has come to the point that displacement by the heavier roller is insignificant, rolling for final compaction should begin. In all cases the heaviest or the roller with the most compactive bearing value per inch width of tread, should be used for this final part of the work. In most cases the unit bearing value of the roller for this type of work should be at least 250 lb. per lin. in. Rolling should be continuous and at a uniform speed not exceeding 220 ft. per min. (2½ mph) until a state of compaction has been developed, such that an undisturbed sample of the pavement shows a specific gravity equal to that developed in the laboratory during the mix design procedure, or in no case less than 95% of that specific gravity.

In order that the pavement will be uniformly compacted a rolling pattern should be followed which will cover the area at the time the material in that area is at the optimum temperature for final compaction. This will vary with the current conditions and may range from about 175° F. at the beginning to 100° F. at the end of the operation. In warm weather the period in which this condition exists may extend over into the following day. Definite changes in specific gravity have been noted after re-rolling pavement the following day. If possible, all necessary rolling should be done during the day that the material is spread.

Recently our Research Department of the Division of Materials began to collect on-the-job data whereby definite information might be obtained from which the effective compacting value of any type of roller may be determined.



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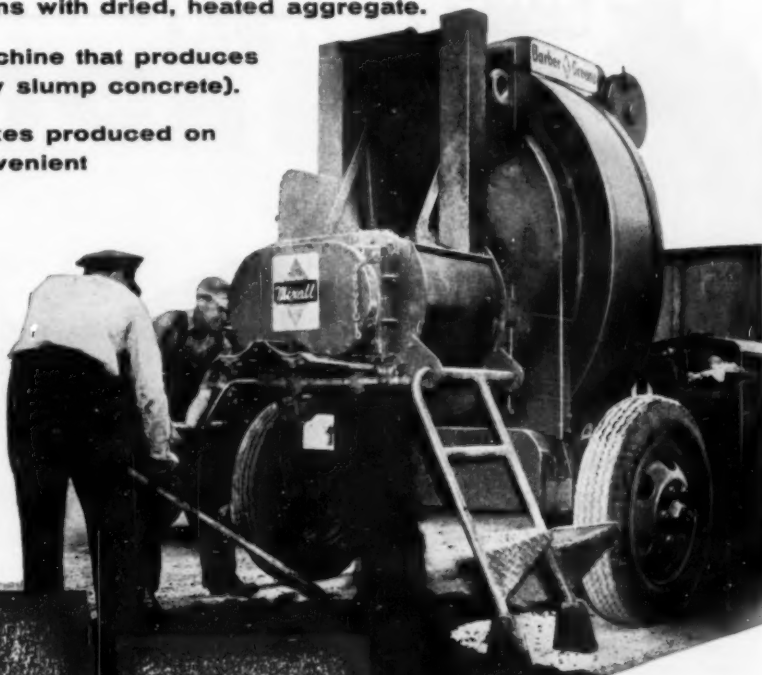
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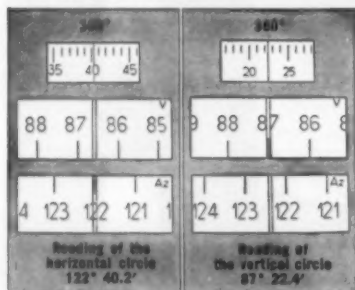


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... for more details circle 219, page 12

## What's New in Equipment and Materials

(See Page 12 for Reader Service Coupon and more items)



New B & L Elevating Grader Attachment

### Light Weight Elevating Grader Attachment

A new B & L elevating grader attachment for the Galion Model 503 motor grader has been announced by Barnard & Leas Mfg. Co., Cedar Rapids, Ia. Attachment features many of the time and field proven design features of the larger B & L elevating grader attachment, but it also incorporates many new and advantageous features. Special note is made of the patented folding mechanism (see picture) which makes this unit especially adaptable for transporting without highway permits.

For more information circle 106 on  
Service Coupon Page 12 and mail now

### New 140 HP Engine for International Truck

The new 140 HP International Black Diamond 264, a high torque, valve-in-head gasoline engine providing exceptional power output and fuel economy, has been introduced as optional equipment for the five R-160 series truck models of International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill. Designed to power trucks in the 14,000 to 17,000 lb GVW range and highway tractors rated at 29,000 lb. GCW, the 6-cylinder BD-264 incorporates major advancements in engine design.

This addition to the complete line of International-built motor truck powerplants, displaces 264.33 cu. in., develops 140 HP at 3,000 rpm and delivers 234 lb.-ft. maximum torque at 2,000 rpm. Ratio of brake horsepower-to-cubic inch

displacement is a notable .53. Important factors in achieving fuel savings in Harvester's newest engine are a newly-designed dual-barrel downdraft carburetor and latest-type manifold.

For more information circle 107 on  
Service Coupon Page 12 and mail now

### Loader Has 180-degree Boom Swing

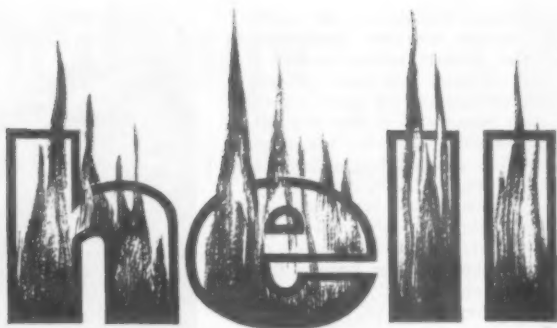
Featuring an 180-degree boom swing, the new Pettibone Speed Swing loader, manufactured by Pettibone Mulliken Corporation, 4700 West Division, Chicago, Ill., permits discharge of load left or right, in addition to front. To accomplish this, the loader does not have to be moved out of the loading position line. Accessory attachments include fork, tote hook, backfiller blade and 4-cu. yd. snow bucket. Offered in  $\frac{1}{2}$  and 1 cu. yd. bucket models, the Speed Swing is designed with a 30-degree bucket tilt-up to provide fast shovel action and permit full loads.

The Speed Swing is available with 2 or 4-wheel drive and optional 4-wheel



Pettibone Speed Swing Loader

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#### **\*How PAVE Remains Active In Asphalt**

Pave is heat stable in asphalt, which means that Pave will not react chemically with asphalt either when cold or at any temperature required to handle asphalt cement and hot mixes. The Pave added to asphalt is not destroyed at working or storage temperatures, and continues to be active in the finished road.

**Carlisle Chemical Works, Inc.**  
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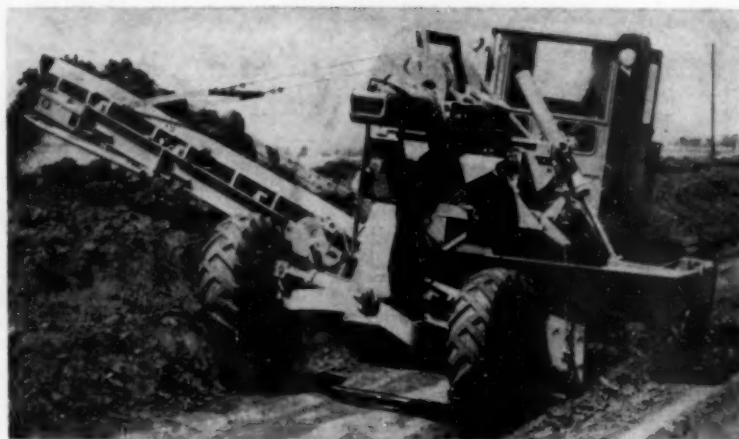


steer. Standard features on all models include: torque converter transmission system that delivers uniform power at maximum efficiency and inch-by-inch crowding without shifting gears; a 5-ft., 4-in. reach from the front tires at a 7-ft. dumping height; and a 3-ft., 3-in. reach at a 9-ft., 8-in. dumping height; forward-reversing lever; hydraulic steering; 4-wheel hydraulic booster brakes and full hydraulic control; powerful down pressure on bucket; bucket float control; replaceable bucket lip; large flotation tires on all four wheels; ball bearing turntable; and heavy-duty axles.

For more information circle 108 on Service Coupon Page 12 and mail now

### Elevating Grader Attachment for Warco

An elevating grader attachment specially designed for Warco 4D-85 and 4D-115 motor graders has been announced by W. A. Riddell Corp., Bucyrus, O. This attachment can be secured as original equipment on a new machine, or machines already in use can be adapted to receive it. In casting, the unit is stated to handle 1,000 to 1,800 cu. yd. per hour. It features a 30-in. adjustable disc of special alloy steel, which feeds onto a 42-in. wide conveyor belt. The standard 16-ft. carrier is readily extended to 19 or 22 feet by the addition of 3-ft. sections. Carrier belt is driven by a shaft and bevel-gear, with power supplied by a multiple V-belt drive through a heavy-



Elevating Grader Attachment on Warco Motor Grader

duty disc clutch controlled from the grader cab. Disc and carrier positions are hydraulically controlled from the cab.

For more information circle 109 on Service Coupon Page 12 and mail now

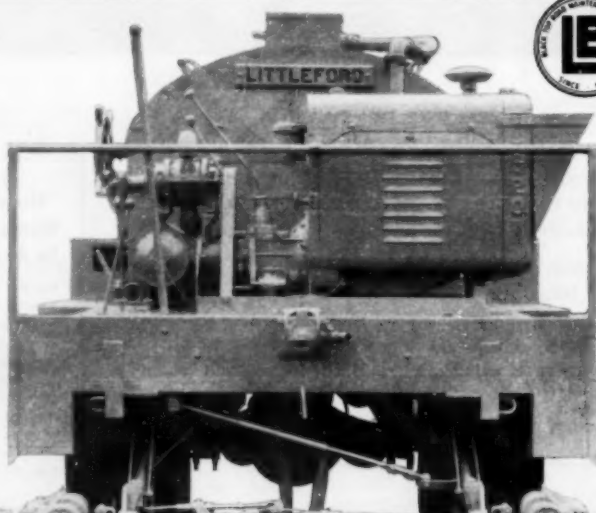
### Asphalt and Aggregate Spreader

A new hopper-type asphalt and aggregate spreader has been introduced by Good Roads Machinery Corporation. The spreader hooks to any standard dump or semi-dump truck without the use of truck-mounted attachments. The extremely simple connection is positive and can

easily be made or disconnected in a matter of seconds. The spreader is transported from one location to another on the truck tailgate. The hopper is mounted on large-diameter, wide, steel rollers, enabling it to travel over sub-grade or base without digging-in or gouging. One of its outstanding features is a "strike-off" unit that floats free of the hopper, riding on 6 ft. long steel runners — insuring consistency and accuracy of spread.

The unit will spread hot or cold plant-mix asphalt, tank-run gravel, coarse or fine slag and limestone, cinders, and

Wide spray bar saves time and money. Shown here is Lite-Wate end folding full circulating bar; mechanical type . . . standard on Littleford SPRAY-MASTER Bituminous Distributor. Spray bars can be furnished up to 24-ft. wide.



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Spray . . . faster . . . easier . . . and cheaper  
with Littleford **"SPRAY MASTER"** Bituminous Distributor

. . . for more details circle 239, page 12

# How to get more mileage out of your road appropriations . . .

THE problem of providing the best possible roads within the confining limits of the yearly budget can be most successfully met by using Tarmac®, a quality road tar manufactured by Koppers Company.

Here's why:

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Second, a Tarmac road will give exceptionally long life with very low maintenance costs. Tarmac effectively resists the harmful stripping action of

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DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, WOODWARD, ALA.



**Tarmac**® MAKES BETTER ROADS

... for more details circle 227, page 12

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Compacting sub-base  
on the Ohio Turnpike.

## DO IT FASTER — BETTER and CHEAPER with the **JACKSON** **VIBRATORY COMPACTOR!**

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**SUB-BASES, GRANULAR SOIL-CEMENT PAVING and SAND FILLS:** It is equally efficient on gravel sub-bases and granular soil-cement paving or base course construction. And it's a bear-cat for compacting sand fills such as bridge approaches, since it quickly achieves desired density and individual units may be subtracted and even fitted with operating handles to suit every condition and to get into the really tight places.

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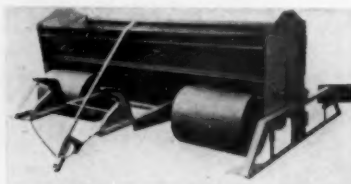
*By all means investigate this time and money saving equipment*

FOR SALE OR RENT AT YOUR JACKSON DISTRIBUTOR

**JACKSON VIBRATORS, INC.**  
LUDINGTON, MICHIGAN

... for more details circle 192, page 12

practically any kind of base materials. Simple adjustment selects any thickness of spread from a feather edge up to 8 in. The standard model has 8 ft. 6 in. overall width, for laying an 8 ft. spread. It may be blocked off for widths under 8 ft., and the width of spread can be extended up to 10 ft. by a simple adjustment taking only a few seconds. For further information write Gomer Jenkins, Good Roads Machinery Corporation, Minerva, O.

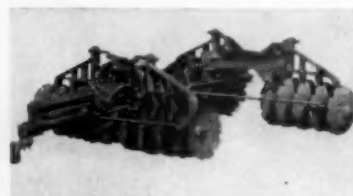


Good Roads Asphalt and  
Aggregate Spreader

For more information circle 110 on  
Service Coupon Page 12 and mail now

### Heavy Duty Tandem Harrow

A new Brushmaster heavy duty tandem harrow series introduced by Alexander Manufacturing Co., Picayune, Miss., is claimed to provide contractors with two implements - in - one. The principal unit has 20 26-in. cutout blades on 10% in. spacings. The cutting width is 10% ft. and the weight is 5,500 lb. The rear unit of this machine is detachable to make the front unit the Brushmaster single bush and bog. It has 10 26-in. cutout blades with a cutting width of 8% ft. It weighs 2,800 lb. Both of these tools are claimed to be excellent where discing and brush clearing work is required.



Brushmaster Tandem Harrow

For more information circle 111 on  
Service Coupon Page 12 and mail now

### Gravel Screening, Crushing and Loading Plant

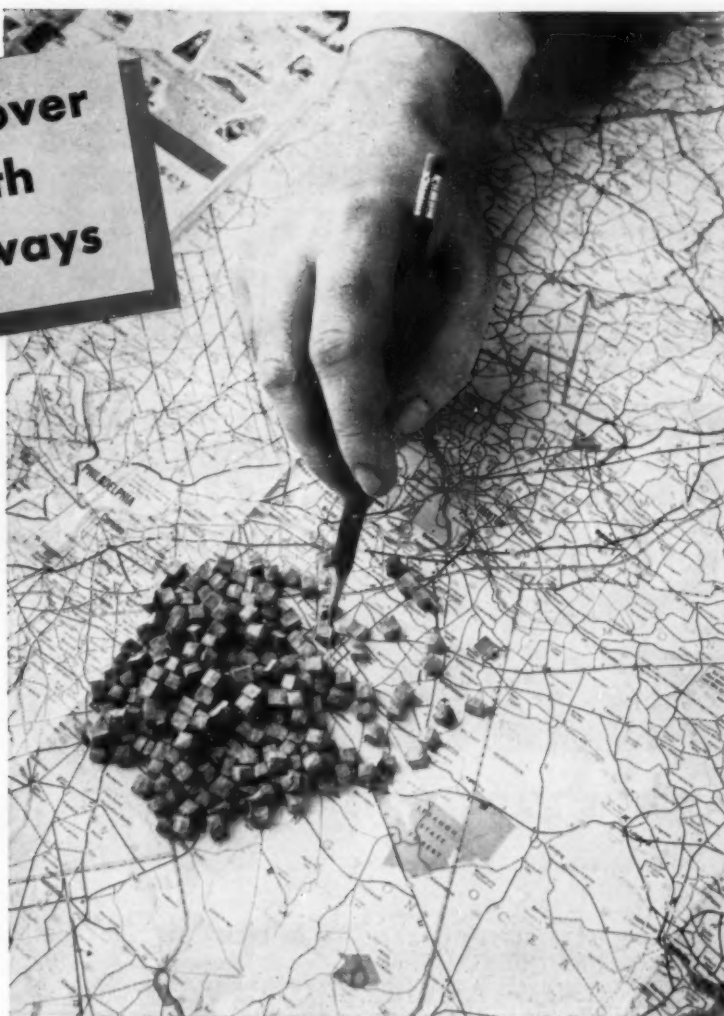
A new TS-Traveler, gravel screening, crushing and loading plant introduced by Universal Engineering Corporation, Cedar Rapids, Iowa, subsidiary of Pettibone Mulliken Corporation, is a completely re-designed version of the original Traveler which it replaces. It consists of a 1% yd. shovel loading hopper with trap grate, reciprocating 19 in. plate feeder, 2 ft. x 4 ft. inclined gyrating screen, a 1024 roller bearing jaw crusher, 24 in. folding channel frame front delivery conveyor, clutch control, and operator's platform and power in a new arrangement on a pneumatic tired gooseneck truck. The arrangement is stated to provide for greater convenience in operation, and results in a more compact, streamlined



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America with  
**RUBBER** highways

New  
Surfa-  
**SEALZ**  
®  
**PELLETS**

make possible  
rubber addition  
right on your jobs!



NOW every asphalt plant in the country is a potential rubber-bituminous mix plant, thanks to Surfa-SEALZ Pellets of concentrated synthetic rubber!

Tossed into a mixing mill, Surfa-SEALZ Pellets break down in 60 seconds, spreading rubber evenly through the mix. In their dry form they are easy to handle...easy to weigh...

easy to store. Once blended, they do not separate.

Rubber-bituminous concrete made with Surfa-SEALZ Pellets needs no special equipment to mix or to lay. And the rubber adds less than \$2.00 to the cost of a ton...surely a low premium for the increased adhesion, cohesion, crack resistance, skid resistance and longer life it promises in surface courses!

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Division of United States Rubber Company  
Naugatuck, Connecticut



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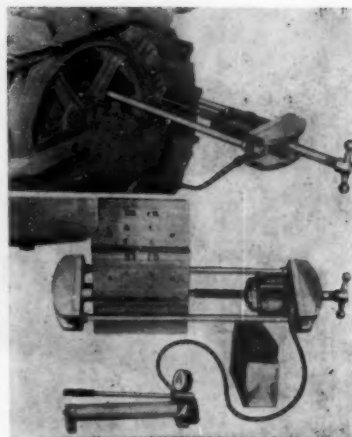
**Universal TS-Traveler Single-Pass  
Crushing Plant**

unit with low feeding height. It is also available with 1010 and 1020 roller bearing jaw crushers.

For more information circle 112 on Service Coupon Page 12 and mail now

### Track Master Pin Remover and Installer

Crawler tractor track master pins can now be easily and quickly removed and installed with the new OTC hydraulic track master pin removing and installing set. Power to do this very difficult, time-consuming operation is provided with the OTC 50 ton power-twin center-hole ram which supplies adequate power for this job. This too operates on all Allis-Chalmers and International tractor models. The illustration shows the tool in operation on the HD-20 Allis-Chalmers tractor. On many occasions when it is necessary to split the track in order to replace a bearing or perform some other maintenance



**Top: Close up of OTC 50 Ton Ram Removing Track Master Pin. Bottom: End View Showing Assembly**



### PORTABLE ASPHALT PLANT

**MODEL L-8, 10-15 TON CAPACITY**



**Stationary Plants L-12 and L-25, 15-30 ton capacity.**

**A COMPLETE ASPHALT PLANT ON ONE CHASSIS . . . DRYER, MIXER, HEATING KETTLE.** Low in cost, small enough to tow, BIG enough to produce HOT mix, (or any other bituminous mix) for drive-ways, parking lots, street maintenance, etc. Equipped with 50 HP LeRoi engine, air operated gates for one man control, divided compartment, reciprocating feeder for proportioning aggregate. Available as stationary plant with 30 HP electric motor.

Write for catalog and name of nearest dealer.

## White MANUFACTURING COMPANY

**ELKHART, 26, INDIANA**

. . . for more details circle 214, page 12

### USE SWENSON SPREADERS FOR ICE CONTROL

**Spreads Salt 200 Lbs. per Mile!  
Spreads Narrow Strip or Full Traffic Lane**

Spreads all materials. Salt, cinders, sand, calcium chloride, rock chips, etc. Adjustable to spread any desired quantity in any width from a narrow strip to a full traffic lane.

Write for Complete Information

**SWENSON SPREADER & MFG. CO.  
LINDENWOOD, ILLINOIS**



. . . for more details circle 208, page 12

### 19 Cu. Yd. Rubber Tired Scraper

A 15 cu. yd. truck, 19 cu. yd. heaped capacity rubber-tired, 4-wheel scraper has been added to the line of pull-type scrapers of Allis-Chalmers Manufacturing Co., Tractor Division, Milwaukee 1, Wis. This new unit is cable-controlled and features positive forced ejection. It provides a 9 ft. 8 in. wide cut with its carbon steel heat-treated offset type cutting edge. Overall length of Model 315 is 33 ft. 5 in. and the width is 11 ft. 6 in. The overall height is 8 ft. 8 in. with blade on the ground, and 9 ft. 2 in. when bowl is raised. Rear bowl ground clearance is 20 in. and front axle clearance 29 in. when 21.00 x 24 tires (standard for the 315) are used. Approximate shipping weight with the 21.00 x 24 tires is 25,850 lb.



**Model 315 Scraper**

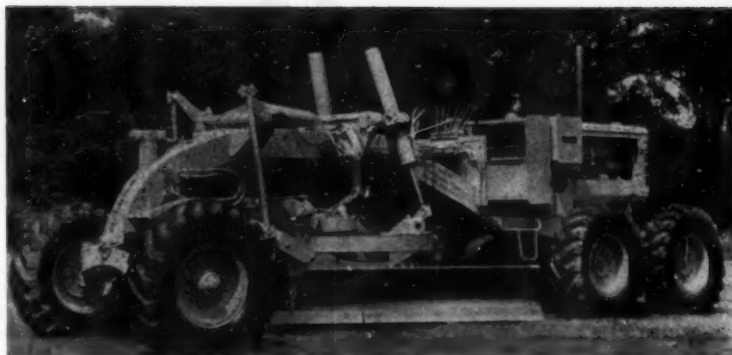
For more information circle 114 on Service Coupon Page 12 and mail now

### 75 HP Warco Motor Grader

A new 75 HP Warco motor grader has been announced by W. A. Riddell Corp., Bucyrus, O. Powered by a IHC UD 350 engine, this Model 4D-75 general duty grader incorporates all construction and operating features already established on the 85 HP general duty and 115 HP heavy duty Warco graders.

The unique rotating saddle, a Riddell patent, permits elevation of the blade to 90° on either side, and passage of the blade from one side to the other, without any mechanical adjustment of linkages. Every blade position is reached by operation of hydraulic controls from cab.

For more information circle 115 on Service Coupon Page 12 and mail now



Model 4D-75 General Duty Warco Motor Grader

### Telescopic Hoists and Dump Bodies

A new line of telescopic hoists and matching dump bodies, for use on tandem axle trucks has been announced by The Galion Allsteel Body Company, Galion, O. Known as Galion Duo-scope Models 55381 and 66381, the new hoists feature forward mounting of telescopic cylinders. This relocation of hoist cylinders, plus new design of subframes, moves more body, hoist and load weight forward onto the truck's front axle. As a result, as much as 1,500 lb. more payload can be carried without exceeding rear axle weight limits, the manufacturer states.



Center-Mounted Model 55381 Galion Duo-Scope Hoist with Model 12N-4 Body

For more information circle 116 on Service Coupon Page 12 and mail now

### New Bucyrus-Erie 3-Yd. Shovel

A new 3-cu. yd. shovel — readily convertible to dragline, clamshell or lifting crane — has been developed by Bucyrus-Erie Co., South Milwaukee, Wis., to complement its line of individually designed crane-excavators. In filling a gap between Bucyrus-Erie Models 54-B and 88-B (2½ and 4 yd. capacity respectively), the new Model 71-B incorporates the basic engineering features and field-proved advantages of the company's current line of general purpose excavators. The major features include: positive twin rope crowd with rectangular inside dipper handle; strong light boom; fully independent boom hoist.

For more information circle 117 on Service Coupon Page 12 and mail now

## NO TIME LOST! LOADING OR LAYING ITS LOAD



A STANDARD STEEL  
PRESSURE DISTRIBUTOR  
GIVES EQUAL CIRCULATION THROUGHOUT  
THE SPRAY BAR FOR A  
UNIFORM SURFACE  
FROM CURB TO CURB  
FOR LONGER WEAR

### STANDARD STEEL PRESSURE DISTRIBUTOR

The Model 424 can be loaded in quick time for a "fast get-away". A two-way cleaning system guarantees a clean spray bar at the end of the day. First, the material is sucked out of the bar and back into the tank. Then by turning one small valve, cleaning solvent is released into pump and spray bar (without contaminating the asphalt in the tank). No time lost in tinkering — no time lost in loading — Standard Steel 424 keeps going all day long far ahead of the "gravel gang"

WRITE FOR CATALOG 424

### OTHER PRODUCTS OF STANDARD STEEL

Maintenance Distributors, Tar Kettles, Patch Rollers, Supply Tanks, Tool Heaters, Asphalt Tools, Street Flushers, Construction Brooms.



Standard Steel Works NORTH KANSAS CITY, MO.

... for more details circle 207, page 12





**\*P. M. =**  
Pressure Metering

Applying bitumen through 2 feet of spraybar as shown may not appear unusual or different, but when the operator can use any length—from 1 to 24 feet—without changing the pressure and without any application adjustment whatever . . . then there's a difference. It's Rosco's Pressure Metering Method that makes that difference.

The P. M. method of applying bitumen is *not* metered by the bituminous pump, nor is the amount of discharge measured in relation to the pump revolutions. Normal wear of the pump and occasional, unavoidable nozzle clogging never affect the application rate. Here again, Pressure Metering *makes the difference* . . . the rate is automatically maintained by Rosco's P. M. system.

It is this Pressure Metering Master Valve, the "heart" of Rosco Distributors, that gives you this built-in control of pressure which is the only accurate method of obtaining precise bituminous application. This is the valve that also directs the flow of material for all of the Rosco Distributor functions.

Make the difference pay off. Let your Rosco dealer show you how. Write the factory for descriptive bulletins with specifications of Distributors with P. M.

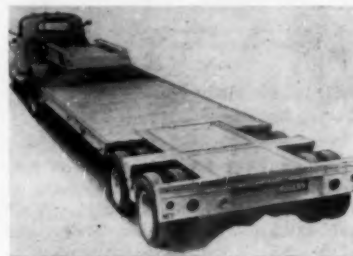
**ROSCO MANUFACTURING CO.**  
3118 Snelling Ave. • Minneapolis 6, Minn.



... for more details circle 204, page 12

### New, Light, Lower Priced Rogers Trailers

Rogers Brothers Corporation, Albion, Pa., has designed a line of lighter trailers. They embody Rogers basic design developed through years of specialization, are built of Mayari, the outstanding light but strong steel, and are equipped with Rogers type "T" rear units which have proved to be very popular. A saving of a full ton is to be made in the 20-ton size with corresponding weight savings in other capacities. Of special interest, however, is the lower prices made possible by simplified construction.



New Rogers Light Weight Trailer

For more information circle 118 on Service Coupon Page 12 and mail now

### Pocket and Tooth for Trencher Buckets

A new pocket and tooth for trencher buckets has been announced by Jetco, Inc., 1100 Westminister Ave., Alhambra, Calif. The pocket is one piece, drop-forged, 1040 high carbon steel. The new design provides a smooth radius in the pocket opening which permits a positive taper fit with the tooth, in addition to the quick change feature. The pocket may be welded on any type bucket, and complements the Jetco line of trencher points. The new rock point, which has been tested under actual rock conditions, is drop-forged from 4140 steel.



Pocket and Tooth for Trencher Buckets

For more information circle 119 on Service Coupon Page 12 and mail now

### Clearing Attachment for Chain Saw

A new, low-cost attachment, that converts the Homelite Model 17 chain saw into an all-purpose clearing unit, has been announced by Homelite Corporation, 48 Riverdale Ave., Port Chester, N.Y. Designed for faster, easier, more profitable clearing, the new attachment eliminates stoop and squat in felling; lets you reach out to the limb without hav-

ing to go underneath; takes the backache out of bucking and under-bucking. Jaw-grip spike permits plunge-bucking of logs right on the ground. Spike bites into the dirt, keeps chain up out of the dirt; spike takes thrust of the chain, prevents logs from rolling or spinning away.



Clearing Attachment Plunge-Bucking

For more information circle 120 on Service Coupon Page 12 and mail now

### 335 HP Wheel Tractor

A new 335 HP Model 200 tractor has



M-R-S Model 200 Tractor

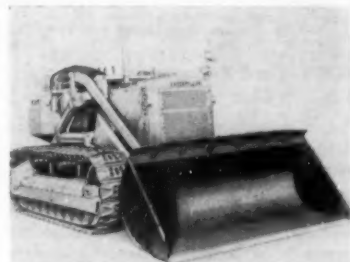
been announced by M-R-S Manufacturing Co., Jackson, Miss. Engineered to power scrapers up to 30 cu. yd. struck capacity pusher loaded and 18 yd. struck scrapers self loaded, the new 19.5 ton prime mover has 10 speeds forward up to 35.16 MPH. Special 4 wheel design, easy power steering, and convenient controls are stated to enable the operator to exact maximum performance.

Equipped with the exclusive M-R-S hydraulic weight transfer device, the new M-R-S 200 is capable of producing as high as 46,956 lb. draw-bar effort. This great tractive ability is claimed to mean far greater assistance to the push tractor in securing heaping payloads in larger scrapers in less time and distance. Rugged construction and simple straight line power train design of the M-R-S 200 are stated to assure the contractor maximum life.

For more information circle 121 on Service Coupon Page 12 and mail now

### Traxcavator Has Increased Horsepower

Increased horsepower and faster travel speeds are among the several improvements of the Traxcavator No. 6 shovel, announced by Caterpillar Tractor Co., Peoria, Ill. This machine will give greater production with the new 2½ cu. yd bucket and improved bucket action with a new hydraulic pump. The engine in the new No. 6 now delivers 100 HP at the fly-wheel.



Traxcavator No. 6 Shovel

In addition to the increased bucket capacity from 2 to 2½ cu. yd., No. 6 shovels now have a two-position feature that allows maximum use of bucket capacity under normal conditions and obtaining of maximum scouring action and dumping action when handling sticky, hard-to-dump materials and features outstanding balance.

# NEW!

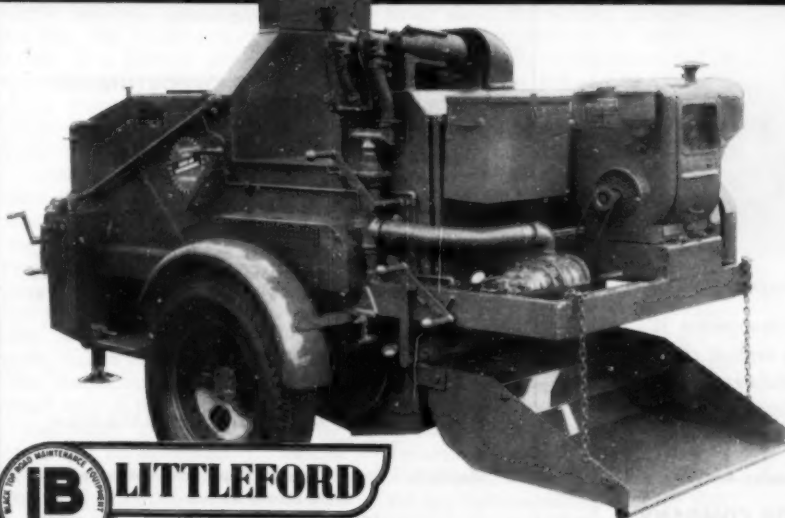
7 ton hot capacity  
12 ton cold capacity

for hot and cold bituminous mixes

LITTLEFORD Model 700

## "TRAIL-O-PATCHER"

Bituminous Mixer



The new Littleford "Trail-O-Patcher" —the first self-contained, all-weather bituminous mixer — gives highway departments and contractors a real break. The 200-gallon asphalt tank holds enough to last all day. And this ingenious new mixer has its own bitumen metering system and its own aggregate drying compartment.

Designed, engineered and built with Littleford quality through and through, the new "Trail-O-Patcher" is your most practical answer to the rising cost of road maintenance. It will pay you to send today for descriptive bulletin EE-28.



**LITTLEFORD**

Littleford Bros., Inc.

454 E. Pearl St., Cincinnati 2, Ohio

... for more details circle 240, page 12

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The Traxcavator No. 6 shovel travels at almost 30% higher speeds with increases from 1.4 mph to 1.9 mph in first gear, from 5.8 mph to 7.4 mph in fifth gear, and with corresponding increases in other gears. The new hydraulic pump increases the pressure in the hydraulic system to 1450 psi. This operating pressure provides greater lifting power for faster bucket action. In addition, the hydraulic system in the new unit will be equipped with a full flow filter.

For more information circle 122 on Service Coupon Page 12 and mail now

### **¾ Cu. Yard Excavator, 5-6 Ton Class**

A new high speed compact excavator in the ¾ yd., 5-6 ton class has been announced by Dixie Crane & Shovel Co., Inc., 2343 North 7th St., Harrisburg, Pa. Crane, shovel or trench hoe rigs are available on either rubber tired crane carrier or on 20 in. crawlers. A complete line of attachments for dragline, clam-shell, magnet, pile driver, grapple or concrete bucket work is offered.

Crane rigged, on rubber tires, the "Dixie" has a lifting capacity of 6 tons with the standard 25 ft. boom at a 10 ft. radius. 5 and 10 ft. boom inserts and a jib can be furnished to supplement the two 12½ ft. standard sections. Equipped as a shovel, the "Dixie" can excavate to a maximum height of 18½ ft. and dump at 13 ft. Maximum dumping radius is 19 ft. It can dig at 2½ ft. below ground

level. The ¾ yd. bucket is equipped with power operated dipper trip. When set-up for trench hoe operation, a "Dixie" can cut 13½ ft. below ground; yet it has an above ground clearance of over 15 ft. at end of dump. The trench hoe can reach out 23½ ft at ground level.

For more information circle 123 on Service Coupon Page 12 and mail now

### **Vibratory Roller**

A new vibratory roller for compacting soils and gravels, and in particular highway and air field subbases, has been introduced by Vibro-Plus Products, Inc., 54-11 Queens Blvd., Woodside 77, N.Y. Extensive test and actual field application are stated to have proved this new vibratory roller may be operated as either a static or dynamic roller, and that vibratory forces are transmitted not only

vertically, but in almost any direction.

The roller consists of a drum with a built-in vibrating element, and a frame that is spring-suspended from the main shaft of the drum. The drum design and a vibration-absorbing device frees the frame from almost all vibration.



"Dixie" Unit as Shovel, Crane and Trench Hoe



Vibratory Roller

For more information circle 124 on Service Coupon Page 12 and mail now

(Continued on page 122)

## **LUCAS ASPHALT COMPACTOR**



### *Eliminates Hand Tamping*

This portable, precision-built compactor is used for tamping and rolling asphalt close to walls, light poles, traffic signals and in all inaccessible places . . . and for use on all types of asphalt patching and repairing jobs.

Contractors, See Your Nearest Dealer, or Write

### **LUCAS ASPHALT COMPACTOR COMPANY**

2209 E. Market St.

Stockton, Calif

## **THE STATE HIGHWAY DEPARTMENT OF INDIANA**

### **Has Vacancies**

#### **For**

Civil Engineering Graduates, Registered Civil Engineers,  
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Merit Increases — Annual Vacations and Sick Leave  
with Pay — Retirement System

Apply to — State Highway Department of Indiana  
State House Annex  
102 North Senate Avenue  
Indianapolis 9, Indiana

. . . for more details circle 247, page 12



## Fabric-in-Asphalt Overlay Failure Due to Stone Size

WITH dozens of successful applications of the fabric-in-asphalt highway resurfacing process on record, the only known failure, a short stretch of the Pennsylvania Turnpike, may have been caused by the size of the aggregates, according to the Wire Reinforcement Institute.\*

A 4½-mile west-bound section of the older paving was resurfaced in 1954 with asphaltic concrete reinforced using welded wire fabric. In October, it was decided to strip the new surface from concrete, and relay it without wire, due to the formation of "pot-holes" and raveling under heavy traffic.

After inspecting the job, Charles M. Upham, well-known highway authority and presently a transportation consultant to the Egyptian government, wrote the Wire Reinforcement Institute as follows: "The binder used in this connection was the large aggregate binder, which theoretically depends more on the interlock for density and stabilization than upon the bitumen binder. On account of this large aggregate the wire reinforcement remained practically in contact with the concrete roadway surface, and many tests showed that there are only a few instances where the wire reinforcement rose to an elevation of ½-inch into the binder . . ."

Mr. Upham advanced this further explanation for the unsuccessful job: "The whole difficulty has arisen by trying to use a large aggregate binder and steel reinforcement. . . . The trouble has come about due to the fact that the reinforcement is more or less in a general plane and the stones form a very irregular plane which, when these planes come together, when rolled, cause many voids in the binder.

"Later these voids become full of water — either from rain, or capillary moisture, or condensation. . . . When heavy traffic passes over these areas there is a churning action which very quickly strips the stone of asphalt and loses its binding qualities. This action takes place underneath the surface, having taken place within the voids. Then the surface starts to crack and breaks up and pot holes appear.

"Personally, I feel there is a big future for reinforcement in asphalt provided there is sufficient research conducted to enable engineers to car-

ry on the work in the proper fashion."

On the many successful applications of fabric-in-asphalt in the past it has been observed that generally the steel reinforcement tends to rise in the binder course about ¼-in. to 1 in. from the existing pavement being resurfaced, and it is in this position that it apparently best performs its functions of controlling and minimizing reflection cracks and preventing "shoving" of the surface. Available records for many of these successful jobs indicate that the maximum size stone in the bituminous mix was ¾ in., whereas the mix on the Pennsylvania Turnpike job had stones up to 1½ in.

While seconding the opinions of Mr. Upham, Frank Brown, Managing Director Wire Reinforcement Institute, a trade association of the manufacturers and producers of most of the welded wire fabric used in this country, and active promoters of the new resurfacing process, said this: "We must not discount the possibility that other factors contributed to this unsuccessful experience. The many successful jobs prior to the Turnpike, with aggregates no larger than ¾ inch, suggest that the inch and a half stone on the Pennsylvania job was a variable factor which may have caused trouble, but until we have the answer to this through research such as Mr. Upham suggests, we will not draw final conclusions.

"We hope to work with the Turnpike engineers and other highway officials about the country (and we solicit their cooperation) in arriving at answers to the problems raised in Pennsylvania to the end that this one failure may be turned into a constructive advance for the highway field.

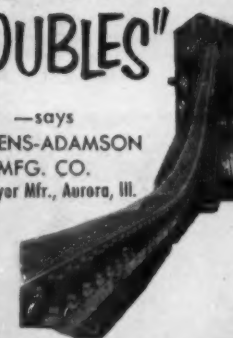
"In the meantime, however," Mr. Brown went on, "we continue to recommend the use of fabric-in-asphalt for resurfacing when a dense mix with aggregates no larger than ¾ in. is utilized. (If aggregates larger than ¾ to 1 in. are used, we recommend that a ¾ to 1 in. leveling course be laid before placing the fabric.)

"Since the Pennsylvania Turnpike job", Brown concluded, "highly successful applications have been made in Baltimore, Boston, Washington, Frankfort, Ky., and New York City. These jobs, taken with other successful applications dating back to 1945, indicate that the fabric-in-asphalt process is well on the way to widespread acceptance."

\*See "Wire Reinforced Overlay on Turnpike," Roads and Streets, October, 1954.

# "NO MORE LUBRICATION TROUBLES"

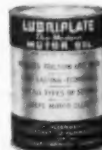
—says  
STEPHENS-ADAMSON  
MFG. CO.  
Conveyor Mfr., Aurora, Ill.



"LUBRIPLATE Lubricants satisfy the 'one-shot' requirements of our conveyor idlers. LUBRIPLATE effectively lubricates each bearing in turn and flows through the hollow shaft to the next bearing. We do not know of a single case of bearing trouble through faulty lubrication where LUBRIPLATE has been used."

**REGARDLESS OF THE SIZE AND  
TYPE OF YOUR MACHINERY,  
LUBRIPLATE GREASE AND  
FLUID TYPE LUBRICANTS WILL  
IMPROVE ITS OPERATION AND  
REDUCE MAINTENANCE COSTS.**

LUBRIPLATE is available in grease and fluid densities for every purpose... LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.



For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.



... for more details circle 233, page 12



## An "OK" from engineers is easier to get with an Etnyre on the job!

As Ernest Loyd, owner of Ernest Loyd, Inc., Fort Worth, Texas, says: "When you appear on the job with an Etnyre, experienced engineers and road men know they are going to get a top-rate job." Good, even coverage of the surface (free from wet or dry spots), plus application of the specified thickness of the mix is assured with a "Black-Topper."

Pictured above is Loyd's Etnyre at work on a one-mile stretch of road leading from the main highway to the Whitney Dam electrical plant at Whitney, Texas . . . a government project.

Not only does Loyd believe that the Etnyre has

the best distribution system available, but he likes the savings in time and labor. The material heats faster . . . the machine is easier to load and drain . . . the motor starts fast even after long periods of inactivity . . . the whole distributor is more flexible to operate and easier to handle.

When you buy a distributor, you are making a substantial investment which should return dividends over a period of years. Why gamble with your money when you can get the very best at little or no premium? For proof, see your Etnyre Dealer or write E. D. Etnyre & Co., Oregon, Illinois, U.S.A.

SEE YOUR ETNYRE DEALER

**ETNYRE**  
**"Black-Topper"**  
 BITUMINOUS DISTRIBUTORS



. . . for more details circle 181, page 12

## FOR SALE CHEAP

Cleaver-Brooks 2 tank car heater, model DS-2, SN 2063, very good condition. \$1,795.00  
 Gledhill road adjuster, used very little 375.00  
 Huber Maintainer, needs repair 295.00  
 Huber 8-12 ton tandem roller, SN T3934, good condition 2,900.00  
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 Euclid rear dump, model 56FD, SN8593, good buy 10,000.00  
 Euclid bottom dump, gas engine, operating condition 2,400.00  
 All Available for Inspection.

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Simplicity S-100  
 5000 lb. pugmill  
 4 ft. x 12 ft. double decked vibrating screens  
 10 ft. x 20 ft. double Shell Dryer  
 Boiler and Asphalt Pump AC line and Dust  
 Cyclone and Filler Dust Bin and Elevator  
 Cold Feed Bin.

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 ROADS & STREETS**

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 Subject to prior sale

## BARGAINS

3 Caterpillar D-7's w/Trackson Hi-Lifts  
 1 Caterpillar D-7 w/Hydraulic Bulldozer. (Price of all 4 — \$15,500.00)  
 Link Belt 370 w/Pull Shovel  
 N.W. 80-D Pull Shovel Attachment  
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 Phone Euclid 6-8691

## FOR SALE

'49 Diamond-T 3½ Ton Truck, with winch, headache rack, tail roller, fifth wheel and single axle lowboy trailer. \$1250.00

212 Caterpillar  
 Motor Grader \$1750.00

**Contact: R. H. DAVENPORT**  
 Phone 64211  
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## BARGAINS!!

4-Wheel Drive 5 Ton Truck — FWD Model SU equipped with 1200 x 14-ply tires in good condition and available with chains. This truck is in excellent condition and has only 29,000 actual miles. Equipped with St. Paul V-type snow plow and American Wing. Complete set of snow lights and steel box.

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- 1 TD-18 International ... 7,500

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- 1 54-B Bucyrus-Erie ... \$23,500
- 1 54-B Bucyrus-Erie ... 20,000
- 1 1201 Lima 3 1/2-yard ... 25,000

Subject to prior sale

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**General Motors Corporation**  
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Allis Chalmers HD19 with Angledozer \$7,500  
Buckeye Model 32 Wheel Type Ditcher 1,250  
Boom, 40 Ft., for Lorain 80 or 82 ... 500  
Hendrix 3 Cu. Yd. Dragline Bucket ... 375  
Caterpillar D8 Pusher Blocks, each ... 75  
Lorain L41 Backhoe Attachment ... 1,750  
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GENERAL CONTRACTOR  
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Gasoline driven truck with rotary sweeper in front. Practically new ... good condition. Sacrifice Price.

Write - Wire - Phone  
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ATwater 9305

## FOR SALE

- 3-LaPlant Choate TS300, Buda Engine, 2100x29 tires, good condition ea. \$ 8,500.00
- 1-LaPlant Choate TS300, 275 H.P., Buda Engine, 2400x29 tires ... 22,000.00
- 1-LaPlant Choate TS300, 275 H.P., Buda Engine, 2400x29 tires ... 17,000.00
- 1-TD24 w/B.E. Bulldozer, D.D. P.U. ... 9,500.00
- 1-P&H 255A Dragline, gasoline ... 5,000.00
- 1-P&H 255A Backhoe, Diesel ... 7,000.00
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- 1-P&H 455A Dragline, Diesel ... 12,500.00
- 1-P&H Mighty Mite Crane on Mack 6x6 Truck ... 8,500.00
- 1-TD18 w/B.E. Bulldozer, cable ... 6,500.00
- 1-TD18 w/Hell Angle Dozer, cable ... 4,800.00
- 2-D8 1H Series with cabs, push plates and D.D.P.U. ... 4,800.00
- 1-D8 2U Series with cab, Bulldozer, D.D.P.U. ... 8,000.00
- 1-C Tournadozer, GM 6-71 Engine ... 9,000.00
- 2-Tournadozers Boxes, less wheels and brakes for D Roadsters, like new ... 3,000.00
- 2-LeTourneau D Roadsters ea. ... 9,000.00
- 1-TD9 Hydraulic Bulldozer ... 2,500.00
- 1-TD6 Hydraulic Bulldozer ... 1,250.00
- 1-Set C. M. C. Bins and Scales ... 1,450.00
- 1-Koehring 16-S Mixer ... 2,000.00
- 1-150 Ton Hydraulic Jack, motor driven ... 1,875.00
- 1-Allis Chalmers Model AD4 Grader, G. M. Engine ... 7,500.00
- 1-Austin Western 99M Grader ... 2,800.00
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- 1-Northwest Model 6 Backhoe Attachment ... 3,850.00
- 1-Hough Loader Model HL ... 2,000.00

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**CONTRACTOR**

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- 1-Gravel Drier - Capacity 200 to 250 Tons Per Hour. Similar to Pioneer #381.
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Power Units for Above Equipment

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Bucyrus-Erie 22-B Transit Crane, equipped with 100' boom, 20' jib, fairlead, tagline and light plant, new motor in upper works. New tires on carrier this Spring. Condition and appearance of machine excellent.

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- 1-Innsley K-12 Hoe, IND. Chrysler power, 18" x 9'-6" tracks. Overhauled. Good machine. Cleaned and painted.
- 1-Innsley K-12 Dragline, Buda gasoline power, 9 1/2' x 24" tracks.
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24" x 36", 18" x 32", 9" x 36", 9" x 21" and 18" x 30" Telsmith RB Jaw Crusher.  
36" Standard Gyrospere Crusher.  
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1 1/4 yd. Marion Gas Electric Shovel.

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Heavy duty 6 yard Autocar dump truck, 2 ton GMC dump truck used only 5 months, best of condition; 21 yard steel bin; Chev. Pick-up; Wisconsin gas engine; Pioneer reciprocating feeder; steam jenny and garage type air compressor. All in good condition.

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Barber Greene 44-C, like new \$10,500  
Austin, digs 16 ft. deep, 24 to 40 in. wide. In good condition, with extra spare parts 5,800  
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All prices F.O.B. cars, Kansas City, Mo.

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- 1—Model "L" Quick-Way 30' Crane (new).
- 1—375-BC American  $\frac{3}{4}$  Yd. Shovel and 55' boom, diesel engine (1952).
- 1—TL-20 Lorain Moto Crane, 30' boom, mounted on Moto carrier.
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- 20—Ingersoll-Rand Compressors — 600, 315, 210 — Wagon Drills — Breakers, etc.
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- 1—50' set pile leads for M. T. Hammer.
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- 1—Barber Green Bucket Loader on crawler.
- 2—Caterpillar D7 Tractors with LeTourneau PCU and Tilt Blade.
- 1—International TD-18 Tractor, diesel, B.E. hydraulic bulldozer.
- 1—Catterpillar D4 Tractor with  $\frac{3}{4}$  cu. yd. Traxcavator.
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- 1—Rex 200 Single Pumpcrete.
- Clamshell Buckets —  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$  & 1 Yd.
- 1—Bay City  $\frac{3}{4}$  Yd. Shovel — Cat. Diesel Eng.
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#### NO DOWN PAYMENT

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Will discount AED rates to responsible parties.

- D-4 w/1 c.y. hydraulic loader.
- D-8 tractor and bulldozer.
- No. 12 Cat motor patrol.
- 500 c.f. Cat diesel compressor.
- 10 ton, near new, truck crane, 3 drum, ideal for piling.
- 28x55' steel barge w/18 ton crane w/65' boom.
- M-115 steel piling, random lengths.
- 4'x8' concrete panel forms, lined.

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powered by Cummins Diesel Engines

\$4,000 each, FOB Long Beach, Calif.

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- MODEL 522 BUCKET LOADER, as is \$1,000
- MODEL 522 BUCKET LOADER, good condition 1,800
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The Above for Sale — Rental Purchase — or Will Trade.

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Complete Inventory Of  
**BRAND NEW**  
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**2 1/2 TON 6x6 PARTS**  
"from a bolt to a motor"

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Largest Stock — Lowest Prices.  
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1/2 yd. Trench Hoe, gas power. We have just reconditioned this machine in our shop. Has Insley Hoe attachment. Available for rental, rental-purchase, or for sale.

**SARGENT "38"**

3/8 yd. Trench Hoe, mounted on GMC 6x6 Truck. Machine used four months on rental. Will rent, sell, or trade.

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1/2 yd. Trench Hoe, gas power. Available for rental, rental-purchase, or sale.

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Rubber-tired Bucket Loader, 1951 model. Priced right.

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**PORTABLE GUNITE UNITS**

Truck mounted compressor, trailer with mixer, cement gun, conveyor, tool box and water pump.

Trailers sold with trucks or separately.

Individual cement guns for sale.

Equipment now located in Oakland, California and San Pedro, California

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These units priced to sell — available for inspection here at our yard.

Also one current model Super C Tournatractor priced right.

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1720 "I" Avenue, N.E.

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2 — 100 HP Lucey portable horiz. fire-box boilers. 200 lbs. Oil fired. ASME Code.

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1 1/4 yard Manitowoc 2000-B crane, Cat D13000 eng. 70' boom.

25 ton Orton Locomotive Crane. Cat Diesel. New 1942. Air Controls.

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Steel Bodies Excellent For High Pressure Heavy Commercial Loads!

200 ea. 3 1/2 Dia. x 11 1/2 stroke ... \$25.00 ea.  
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**BUCKET ELEVATOR**  
18" Wide Buckets, on Belt  
At Least 80 Ft. Centers

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Repaired and in perfect shape. Size 17'x40', #6 Duck, Weigh 160# — \$47.60 each.

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Vulcan and McKiernan-Terry  
Steam Pile Hammers and Extractors  
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**We Sell Very Cheap**

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35 - 20 & 15 Ton LOWBED  
TRAILERS.

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EUCLID REAR DUMP  
TRUCKS.

(Will Consider Renting Shovel & Trucks)

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**CONSTRUCTION EQUIPMENT**  
311 W. Diamond Ave. Hazelton, Pa.  
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20,000 Gallon Coiled Tanks for  
Asphalt, Trinidad and Emulsion  
\$1500 each Can Deliver

P.O. Box 395  
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Koehring #34 E. Dual Drum Paver  
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Lima #34 Paymaster Crane, Dragline  
#4831.  
Lorain L-50 Crane, Dragline #20440.  
Cat. #12 Grader #8T 1331.  
Cat. #12 Grader #8T 3027.  
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R B Finegrader S/N #405.  
Model 848 Barber-Greene Asphalt  
Plant Complete.  
Cat. #20 KW Light Plant.  
Cat. #D8 Tractor IH 9738.  
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All of above equipment located  
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Pugmill Unit w/GMC Engine, new Novem-  
ber 1953 — Hot Elevator Unit between  
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unit with Simplicity Screen — Hot Elevator  
w/Ford 6-cyl. engine dryer to gradation  
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Clearage Fan. Price .....\$39,900.00

## BUBLITZ MACHINERY CO.

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## TRUCKS WANTED

Highest dollar value paid for new  
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## Used Equipment for Sale

In all parts of the country.

We welcome your inquiries.

84 x 66 & 42 x 40 A-C jaw crushers — 85  
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Jaw crushers up to 48 x 60 — gyratories —  
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Koehring 503 Diesel crane  
Bay City 45 Dragline  
Northwest No. 3 truck crane  
Ford tractor with Wagner loader  
Cedar Rapids 30x18 roll crusher  
Pioneer port. gravel plant: Diesel

## TRACTOR & EQUIPMENT CO.

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## MISCELLANEOUS EQUIPMENT

- 2 — Ingersoll-Rand Wagon Drills
  - 2 — 15 ton Fruehauf Flat Bed Semi Trailers
  - 2 — Diamond T Tractors
  - 1 — D-8 Bulldozer
  - 1 — Euclid 8 cubic yard End Dump Truck
  - 1 — National Vertical 40 H.P. Boiler
  - 1 — Erie Horizontal 80 H.P. Boiler
- All boilers are equipped with oil burners

Subject to prior sale

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Box 188 — Grahamsville, New York

Sterling 1-1950  
Grahamsville 2861

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Experienced asphalt plant erection and operation supervisor  
who would be interested in factory service man position as  
career with opportunities. Substantial family man preferred,  
35 years or older. Send details.

## MADSEN IRON WORKS, Inc.

Box 38  
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## Equipment For Sale -- Like New

1950 Caterpillar DB Tractor with hydraulic angle dozer and Hyster Hystaway attachment.  
1950 Caterpillar DW10 Tractor with cable lift dozer and Hyster winch.  
1950 Rome Tandem Plow.  
1953 Case Model LA1 Tractor with Lull Shovel loader.  
1 V type plow of Caterpillar make for DW10 tractor.  
1 Hyster Back Hoe attachment with bucket.  
1 Drott dozer blade.  
1 Bucket orange peel.  
1 Bucket 4B loader model 643.  
1 Transit level.  
1946 White Truck Tandem with winch and loader.

## ORLANDO CONSTRUCTION CO.

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Koehring 34E Dual Drum—New  
1947—Rebuilt in 1954—Used  
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Rex Model GG-34E Dual Drum  
New in 1947—in Good Condi-  
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These Trucks are in Like new Condition

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- 1—116 Galion Patrol
- 1—16" Dewalt Saw 1 IR Wagon drill
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- 1 Model 6 N.W. Shovel 1 1/2 cy diesel
- 1 Model 25 N.W. Shovel 3/4 cy diesel
- 1 Caterpillar D8 Bulldozer
- 1 Shovel Front for Model 6 N.W.
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Williams Construction Co.  
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Wagon drills, jack hammers, air hoists, tampers,  
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K.W.	Volts	Phase	Engine	Price
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complete w/Twin Disc Clutch and Out-  
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Alemite Processing Unit, complete w/tanks,  
guns, rubber hose on reels, 5 HP Air Com-  
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Above Equipment offered F.O.B. Brooklyn,  
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Consider rental purchase. Ky.  
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Single Units — \$26.50 ea. P.O.B. Canonsburg.  
Special Prices in Quantities.  
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## IMMEDIATE DELIVERY

AC model HD-19 with bulldozer — rebuilt and guaranteed.  
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For water, gasoline, fuel storage: used tank trailers 18' to 31';  
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Also, below market price: 26' single axle steel van trailers; ideal  
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Equipped to lay field tile.  
Will dig to depth 4 1/2 ft. and up to 24" wide  
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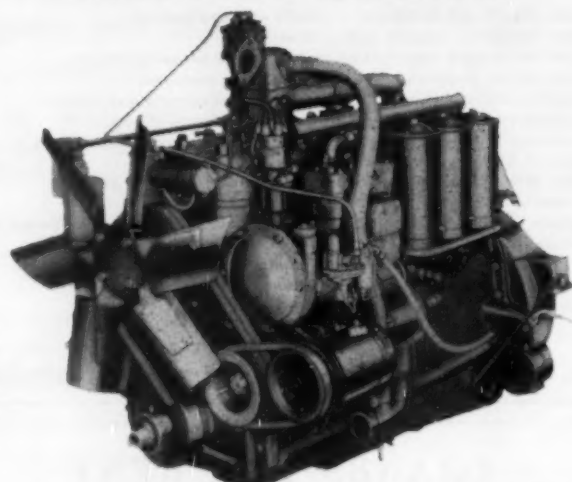
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USED IN WHITE, BROCKWAY, FEDERAL, REG, CORBITT, BIEDERMAN  
Slightly Used Take-Outs — All Accessories — Low Mileage Guaranteed

Price — \$550.00 Each

Also For Sale 15,000 lbs. Gar Wood Double Drum, Winches, Including  
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1	10' x 12' Blasting Mat — 7/8" & 3/4"	6/9/53	282.00	200.00
2	12' x 14' Blasting Mats — 7/8" & 3/4"	1/6/54	378.00 ea.	250.00 ea.
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1	Gardner Denver Jack Hammer	1/1/54	400.00	275.00
1	Gardner Denver Paving Breaker	1/1/54	370.00	250.00
1	Thor Clay Spade	1/1/54	280.00	125.00
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1	Dodge (1950) Dump Truck — V. Liner	5/11/53	1,675.00	1,000.00
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1	12 Volt Booster Battery	1/20/54	75.00	50.00
9	220 Volt Floodlights	2/18/54	22.00 ea.	10.00 ea.
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## PLYWOOD TOOL BOX



21" long, 9 1/2" wide and 6" deep, with two snap locks and leather handle. Price each \$1.50; lots of 10-25, \$1.35; over 25, \$1.25.

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- 1—9"x15" Champion Jaw Crusher.
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- 1—Telsmith Portable Plant—10"x21" overhead eccentric Jaw Crusher, driven by 4 Cylinder Gasoline Engine, 20' Folding Elevator. Steel frame, wheels and draw bar.
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- 1—Allis-Chalmers 10"x24" Roller Bearing Jaw Crusher; practically new.
- 1—Pair New Holland 16"x16" Rolls (Lot spare shells and parts).
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- 1—New 3' x 3' Link-Belt U.P. Shake-out.
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Formerly owned by the State of Illinois. 90 to choose from — KB5, KB6 and KB57 Internationals, Diamond T's Model 509. Federal Model 25M2, 2 Speed rears.

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Locomotives, 10 to 100 tons, std. & 36" ga.  
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Shovels, draglines, cranes, 1 1/2 to 14 yds. (15).  
Whirley portal gantry cranes, 35160 tons.  
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20-Ton capacity Toledo Scales 24' x 9' Platform.  
Dial 100,000 x 10# gradation.  
2500# tare beam.  
10,000# Capacity beam.  
#20 Head with doors.  
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**DRAG BOOM**

70' Dragline boom with fair leads for Bucyrus-Erie 43-B or 44-B.

**DRAGLINE BOOM**

90' crane or drag boom, lattice cord angle  $3\frac{1}{2}" \times 5" \times \frac{3}{4}"$  lattice bracing, 1  $\frac{3}{4}"$  pipe tubing with point sheaves.

**120-B DRAGLINE BOOM & BUCKET**

Complete front end dragline equipment for 120-B Bucyrus-Erie 90 foot lattice-type boom; all necessary hoist machinery for conversion with suspension cables. Complete with 4-yard Ax drag bucket.

**75-B LORAIN SHOVEL**

75-B  $1\frac{1}{2}$ -yard Esco Rock Dipper - 21 foot box type boom; 16' crowd dipper sticks; powered by 200 H.P. Buda model #844 diesel engine.

**CRUSHERS**

Two Pittsburgh-McNally 36 x 54 Single-Roll crushers. Good condition.

**ROTARY CONVERTER**

300 KW Westinghouse Rotary Converter, 1200 RPM, 600 Volts, DC, 500 amps - 60 cycle, 6 phase, Style 74-D-837. No transformers but with complete automatic control panel. Excellent condition - completely overhauled.

**750 KVA TRANSFORMER**

750 KVA Westinghouse - Type S-1, 41-60/4160 volts, primary Delta, Secondary Wye - two  $2\frac{1}{2}\%$  taps above and below 4160 - Impedance 5.5% - oil insulated, self-cooled. Full load continuous rise 55°.

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Serial No. 4006588, Type TC-6, 200 KW, 1200 RPM, Form P, DC, 60 Cycle, Amps 667 nominal, 300 Volts, 1000 Amps two hours 55° C. rise; full switching gear and transformer with automatic DC circuit breaker (ITE Class 1-3).

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**For Sale — \$300,000 Worth of Late Model Rubber-Tired Dirt Movers!**

All in Good Operating Condition

All Operated by One Owner from 2800 to 3400 Actual Hours.

**3 - Allis-Chalmers TS 300's - \$16,500 each**

With Cummins Model NHBIS — 600 Diesel Engines

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With Cummins Model NHBIS — 600 Diesel Engines

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Special price to buyers of three or more units. Offered on a first come, first served basis. This is the largest and best collection of used Earth-Moving Equipment in our history. Don't miss it.

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2 7FDT Euclids

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Pipe 4 and 6 inch

15x36 Jaw Crusher

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**First Class Equipment**

- 1—Telsmith Crusher 20A.
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- 1—TD18 Hydraulic Angle Dozer.
- 1—T9 Swing Crane.
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Phone — Pullman 5-6000

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## OSGOOD MOBILECRANE — MODEL 705 WM



SERIAL NO. 3623

WEIGHT 85,000 lbs.

HEIGHT 13 ft. 3 in.

ENGINE CATERPILLAR D-13000

WHEEL BASE 16 ft. 0 in.

OVERALL WIDTH 10 ft. 1 3/4 in.

TIRE SIZE 1200x24

TRAVEL SPEED 5 mi. per hr. 4th Gear

BOOM 50 ft.

● GOVERNMENT SURPLUS WITH VERY LITTLE USE. MACHINE IN A-1 MECHANICAL CONDITION. FOR SALE — RENT — RENTAL PURCHASE. — PRICE \$20,000 F. O. B. ATLANTA, GA. LOCATION, ATLANTA, GA. INSPECTION INVITED.

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ATLANTA, GEORGIA

Phone MAin 0504

## FOR SALE

### AT A SACRIFICE . . . BRAND NEW

STANDARD STEEL Asphalt Paving Plant, Series SEM 4000 lb. Semi-Portable (100-125 Ton per hour) using combination Diesel Engine, Electric Gearmotor and Motor Drives. Including cold elevator with 16"x8" buckets; 72"x30' sand dryer with burner and drive excluding power unit; base structure; mix and weigh section; stairway, platform and ladder; 40-ton storage bin with gates, overflow pipes, reject chute; 48"x12' horizontal vibrating screen with 4-way separation and drive; steam jacketed mixer with drive excluding power unit; mixer dust housing; weigh hopper scale system; steam jacketed asphalt bucket with scale system; hot dust collecting system including 10' diameter cyclone, piping, fan; dust elevator with gearmotor; dust bin and screw with motor; timer with mixer, weigh box interlock and batch counter; fuel oil pump set; recording pyrometer; UD-24 diesel engine for mixer drive, including one 40KW generator and 2 UD-14 diesel engines for dryer and fan drive.

*Condition: Completely new, Never erected or operated . . . Price: Reasonable.*

**BOX 1144, ROADS & STREETS**

22 W. Maple St.

Chicago 12, Ill.

## FOR SALE

LATE MODELS — MIDWEST LOCATION  
Four Lorain 80-Js, long booms, wide cats,  
Cat diesels, erection cranes.  
Two Manitowoc 3000-Bs, long booms, jibs,  
Cat diesels, wide long cats.  
1 Manitowoc 3900, long boom, Cummins  
Diesel, Torque Converter, Wide, Long Cats,  
Dragline.  
1948 model 95 Northwest dragline, 75 ft.  
boom, Murphy diesel, excellent, \$22,000.  
Four 38-Bs clam-drag-shovel-backhoes, Cat  
diesels, wide long cats, 1952 models.  
One Lorain 80J Camel Back Backhoe At-  
tach., Unused.

**JAMES C. FRENCH**

226 Berry Pkwy. — Talcott 3-4927  
Park Ridge, Illinois

## FOR SALE

K-30 LeTourneau heavy duty rock  
ripper, 18x24 20-ply tires. Very  
good. Picture furnished on re-  
quest. Also D-8 Hyster winch.

**HILLS**

**CONSTRUCTION CO.**

Mankato, Kansas

Phone 268

## SNOW PLOWS

2—Baker Heavy Duty 9 ft. blades—Bumper  
type mounting with monarch 12 v. electric-  
hydraulic controls—New 2 years ago, never  
used. Paid \$1350.00 for pair will sacrifice  
for firm \$800.00

**DANIEL GLERUM & SON**  
195 Sargeant Ave. Clifton, N.J.  
GRegory 3-8318

## WANTED

3000 Ft. 9" HELTZEL Road Forms

**R. H. RAND**

Box 1737

Pittsburgh 30, Penna.

## FOR SALE

**KUE KEN CRUSHER**

18" Gryatory Cone; used 100 hrs. \$2550

**GENE GODON**

Box 357 Colusa, California



## FOR SALE

1 Caterpillar Model 11 motor patrol with 14 ft. moldboard, 11 tooth scarifier, V-plow and wing.

Price, less plow and wing.....\$1,000  
with plow and wing.....\$1,250

1 Buckeye model 70 combination shovel front & backhoe, 3/4 yd. capacity. Gasoline powered 1947 model.

1 Barber-Greene model 82 A crawler mounted bucket loader. Powered by Buda 6 cylinder gasoline engine.

1 Austin-Western Model 99 motor patrol equipped with 14' moldboard, 11 tooth scarifier, powered by International UD-14 Diesel. Price.....\$1,000

All in Excellent Condition

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EQUIPMENT CO., INC.**

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Minneapolis 14

Minn.

Lincoln 7648

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We specialize in the recapping of tires for your work. We have the tread designs you want for your trucks, patrols, and off the road equipment. We give you such proven designs as Hard Rock Lug, Road Lug, Sure Grip Grader, and Suburbanite with NEW TIRE LOOKS, NEW TIRE GUARANTEE, AND NEW TIRE PERFORMANCE AT BIG SAVINGS.

CALL US COLLECT AT 4476 for our quotations on Recapping and New Goodyear Tires.

**NELSON TIRE SERVICE, INC.**  
Winona, Minnesota

HEADQUARTERS FOR  
GOODYEAR

## ATTENTION

### Gravel and Stone Producers

Gravel plant, 125-ton per hour capacity consisting of six wood bins, one 48"x26'6" triple jacket revolving screen, two vibrating screens, two sand separators, one 4' Symons Cone crusher, one roll crusher, one 8" centrifugal pump, 16" to 30" material conveyors. All plant equipment individually motor driven. Plant located adjacent to railroad on 12 acre tract, 3250' of loading tracks.

Gravel deposit depleted, available stone deposit within economical operating belt conveyor distance. Shipments may be made on two major rail lines without switch charge. Good setup for experienced stone operator. Prefer to dispose of plant as a unit but will consider selling piecemeal.

Also, one 1-yard P&H crane suitable for material yard, one 1-yard Monaghan dragline. All in operating condition, miscellaneous buildings, small tools, spare parts and supplies.

**RAY & SON, INC.**  
Louisiana, Missouri

## WANTED AGGREGATE BIN

150-400 Ton, 3 or 4 Compartment

**C. K. BURSON**

Box #427, Bridgeville, Pa.

## 90 Day Factory Guarantee NEW PASKO TRAILERS HEAVY DUTY 25 TON

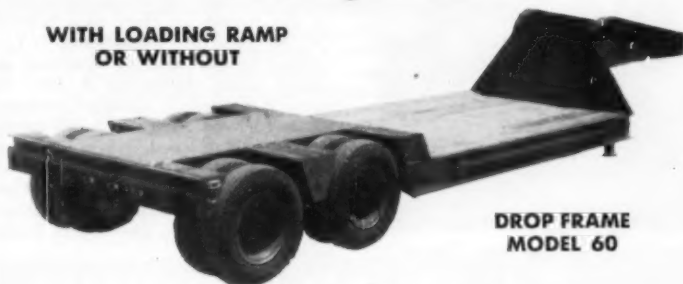
15" and 20" Wheel



**FLAT BED  
MODEL 50**

**PRICE \$2453.70** Plus 8% Excise Tax

WITH LOADING RAMP  
OR WITHOUT



**DROP FRAME  
MODEL 60**

**PRICE \$2546.30** Plus 8% Excise Tax



**PRICE \$2546.30** Plus Tax

**FLOAT TYPE or OIL RIG MODEL 70 — LIFT HOOK IN FRONT  
DOLLYS FOLD BACK TO DROP TO GROUND**

Trailers Made to Your Specification

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Phone CH 10124

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Foundation Investigations — Laboratory analyses and Evaluation of Construction Materials — Soil Mechanics, Concrete and Asphalt Technology. Field Inspection and Consultation. Special Investigations for Dams, Turnpikes and Airports.

710 North Brookfield

South Bend 28, Indiana

## New Equipment

(Continued from page 108)

### Ateco Loader for Deere Tractor

An Ateco loader for exclusive use with John Deere 40-C tractor is being manufactured by Greenville Steel Car Co., Greenville, Pa. The tractor-loader unit has a 7 ft. 11 in. clearance in dumping with a 2 ft. 6 in. reach at maximum height. At all hinge points of the loader there are replaceable lubricated pins and bushings. The hydraulic system features double-acting polished cylinders, chromed piston rods with V-type packing, heavy duty front-mounted dump, dual control valve, and large oil reservoir.



Ateco Loader on John Deere Tractor

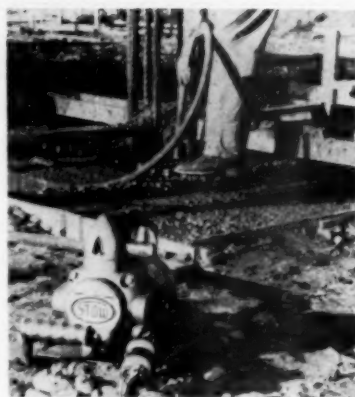
The same hydraulic system can be used to operate other hydraulically-controlled equipment. Constructed so that it can be removed in 45 minutes, the loader assembly mounts on both rigid bars of the tractor with large square clamps.

The ½ yd. bucket on the loader has automatic, quick tilt-back and leveling action after dumping. The bucket's hinge pin is adjustable for instant hydraulic tilt-back if needed for faster loading with less spillage of wet concrete, gravel or dry bulk materials. Leveling is automatic which eliminates bucket position gauges. Bucket teeth are also available. The unit has a scarifier which replaces counterweight and utilizes bucket dump cylinders for operation.

For more information circle 125 on Service Coupon Page 12 and mail now

### Electric Concrete Vibrator

A new Model BU electric vibrator put on the market by Stow Manufacturing Co., 65 Shear St., Binghamton, N.Y., is claimed to run at 9000 vibrations per minute while developing 2 HP. The motor is a specially designed universal, totally enclosed, high speed ball bearing motor. A high-speed, reinforced, ½ in. flexible shaft is used which can be obtained in lengths of 7, 14, or 21 ft. Combinations of these lengths can be attached to each other to give longer lengths up to 35 ft.



Model BU Electric Vibrator

The BU machine is furnished with a 2½ in. model 2500 vibrator head. This head can be obtained with either a steel or rubber tip. The eccentric weight is mounted in special high speed duplex ball bearings at each end for maximum rigidity and load capacity. Additional heads interchangeable with Model 2500 are: Model 1600 (1½ in. x 10 in.), Model 2000 (2 in. x 10 in.).

For more information circle 126 on Service Coupon Page 12 and mail now

### New Hopto Digger Has 20% More Power

A 20% increase in power and a boom and dipper stick of formed plate are features of the Hopto digger Model 200 DTM-55 added to the line of Badger Machine Co., Winona, Minn. Inside diameter of the hydraulic cylinders that operate the boom, dipper-stick and bucket control has been increased to 5 in. In addition to the greater rigidity and strength of the formed plate dipper-stick and boom, this construction feature is stated to eliminate possibility of damage to the cylinders.



Model 200 DTM-50 Hopto

The new Hopto (200 DTM-55) is similar to the 120 TM-54 standard truck model in that both units are for mounting on any 1½ ton or larger truck. Either unit may be powered by an air-cooled or water-cooled unit or from the power take-off of the truck.

For more information circle 127 on Service Coupon Page 12 and mail now



### EAGLE'S NEW DESIGN GIVES YOU GREATER LOADING HEIGHT AND GREATER THROW

It's no problem to pitch the load onto any standard truck — even the higher ones — with Eagle's longer and higher conveyor.\*

The farther throw of this longer conveyor (now 15') simplifies loading trucks immediately ahead of the Eagle. Raising or lowering conveyor can now be done hydraulically between 9' minimum and 11' maximum.

Send for details and prices!

\*Extra length and hydraulic control are optional at slight extra cost.

**EAGLE**  
JAW CRUSHERS • IMPACT BREAKERS  
PULVERIZERS • CONVEYORS • LOADERS **CRUSHER CO., Inc.** GALION OHIO-U.S.A.

... for more details circle 237, page 12

## Manufacturers' Literature

### Wall Chart for Welders

A 24-in by 36-in. wall chart, available from Stulz-Sickles Co., Newark 5, N.J., has actual-size illustrations of Manganal wedge bars. It is a simple matter to determine the correct wedge bar to be used in rebuilding any worn tooth by direct comparison to the full-size illustrations.

Twenty-three different sizes of Manganal 11%-13% manganese nickel steel wedge bars are pictured, designed to fit properly any size or condition of worn tooth, either cast manganese steel or high-carbon steel.

Also listed are complete dimensions and estimated weights of Manganal 11%-13% manganese-nickel steel flat, round and square applicator bars, widely used to save welding time and expense in the replacement of metal worn away by impact and abrasion. Typical applications are in shovel and dragline buckets, hoppers, chutes, truck bottoms, rock crushers, etc. Five sizes of Manganal special shape applicator bars for rebuilding worn tractor grousers are shown.

For more information circle 128 on Service Coupon Page 12 and mail now

### Forms Require Fewer Stakes

The Hogan curb and gutter forms are illustrated and described in a circular issued by The Hogan Co., 3400 Arlington Ave., Riverside, Calif. The advantages claimed for these forms include the following: fewer stakes required; mechanical connections afford quick setting to line and grade; quick stripping eliminates need of hammer and nails; forms are stronger, more rigid; more uniformity obtained without the use of spreaders, braces, etc.; wide spacing of supports permits greater accessibility for finishing.

For more information circle 129 on Service Coupon Page 12 and mail now

### Diesel-Powered Crawler Tractors

The story of the complete line of Allis-Chalmers Diesel-powered crawler tractors is pictorially told in "Facts . . . on a New Breed of Tractors" released by Allis-Chalmers Manufacturing Co., Box 512, Milwaukee 11, Wis. This new 16-page color brochure follows *Time* magazine's format to present an editorial message, operational methods and specific feature advantages of the four crawlers in the A-C line. Action photographs give a comprehensive review of the crawlers at work on jobs in every possible market. Reading time is held to a minimum through the use of brief, fact-filled, picture captions. In addition, the new book also includes a review of crawler tractor progress the past 100 years. Specifications of each of the four tractors in the A-C line are listed.

For more information circle 130 on Service Coupon Page 12 and mail now

## Prevent DELAYS ON-THE-JOB with fast, sure GILSON Screen Testing

Foul-ups in sizing specifications can be costly. You can test every shipment of highway aggregate—quickly and accurately—with the GILSON Mechanical Testing Screen.

The GILSON Screen pays for itself many times over—and GILSON does the job fast—five minutes or less per complete test.

GILSON handles up to one cu. ft. of sample—crushed stone, gravel, slag, coal, ores

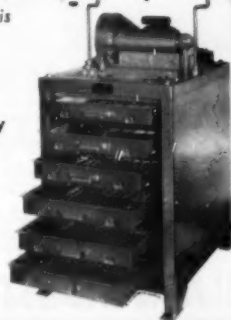
A Sand Attachment for handling 8-inch sieves is optional equipment.

Here's why you want GILSON

1. Makes tests quickly and accurately
2. Two to seven separations simultaneously
3. Screen trays independently removable
4. Trays balanced to same tare weight
5. Visible separation to refusal
6. Few moving parts
7. Sturdy construction
8. Size range 4" to 200-mesh

NO MORE GUESSWORK ON SIZING  
NO MORE TEDIOUS SCREENING BY HAND

Write for information and prices



## GILSON SCREEN COMPANY, Malinta, Ohio

... for more details circle 183, page 12



How to trench  
across a stream...

Ice and the swift current of Rock River presented a formidable hazard to a contractor engaged in laying 4 in. natural gas pipe. He consulted with Sauerman engineers.

The result was an efficient working arrangement using equipment best suited for that particular job. The crossing was made with minimum expense and risk.

A track cable was stretched across the river and hung so it closely paralleled the slope of the river bed. A Sauerman Crescent Scraper was attached to a single-wheel carrier which rode the track cable. Digging depth was almost automatic, since the scraper could dig no further than the length of the cable which attached it to the carrier. The track cable also served to keep the scraper working in a straight line.

The 3/4-cu. yd. Crescent was powered by a two-drum hoist. Maximum span was 700 feet. One man handled the entire trenching operation. A second man was used occasionally to check the depth of the cut. Material pulled in by the scraper was removed by a small clamshell.

For more information and some new ideas, write for Field Report 219, Scrapers with Boom Machines, Field Report 209, Scrapers with Tractors and Catalog J.

## SAUERMAN BROS. INC.

624 S. 28th AVE.

BELLWOOD, ILL.

... for more details circle 205, page 12



SOIL AIRE  
**ROLLPAC**  
Ruggedly built for heavy-duty service



**\$895.00**

DETACHABLE  
Outside Edger  
Wheel. Rolls flush  
with curb or wall.  
Optional.

A Standout Popular-Priced  
One Ton Roller. Send for  
Catalog.

**SOILAIRE INDUSTRIES**

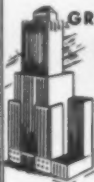
Minneapolis 3, Minnesota

Sold by over 75 distributors in United States and Canada

... for more details circle 224, page 12

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IN NEW YORK CITY**

Call Your Local  
Travel Representative  
or  
Teletype — NY 1-3601



**GRAND CENTRAL AREA**

Hotel **Shelton**  
Lexington Avenue at  
49th Street

1200 modern rooms tele-  
vision equipped. Reasonable  
rates. Swimming pool  
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Coffee Shop, Restaurant,  
Cocktail Lounge.

**RADIO CITY AREA**

**Abbey Hotel**

51st Street, Just East  
of 7th Avenue

A 23-story modern hotel.  
Accommodates 1,000  
guests. Sensibly priced.  
Breakfast Room. Stock-  
holm Restaurant. AAA  
recommended.



**TIMES SQUARE AREA**

**King Edward Hotel**



44th Street,  
East of Broadway  
Comfortable accommoda-  
tions for 800 guests at  
reasonable rates.

Coffee Shop  
and  
Cocktail Lounge



**Long Arms for Your Tractor**

Owners of tractors equipped with a two-drum winch will be interested in the specifications and information in Bulletin No. 160, recently published by Sauerman Bros., Inc. The bulletin gives scraper and slackline bucket sizes for tractors from 40 to 150 hp. Maximum spans, line speeds and capacities in cu. yds. are also shown. Tractor-powered Sauerman scraper machines can work in places that do not allow the head room other machines require, as well as over surfaces that will not support their weight. The slackline cableway gives owners a long range excavator with very little additional investment. Sauerman Bros., Inc. Dept. R-18, 820 S. 28th Avenue, Bellwood, Ill.

For more information circle 131 on  
Service Coupon Page 12 and mail now

**Tournatractor Features  
Illustrated**

A 28-page folder in color, describing and illustrating features of the 208 HP rubber-tired tractor built by LeTourneau-Westinghouse Company, has been issued by the company. By extensive use of photos, diagrams and charts, the folder shows how the unit's range of speeds cuts minutes from the work cycle, and reasons why the machine requires low maintenance and few repairs. Colorful blow-ups illustrate how anti-friction bearings put more horsepower to work, how the machine's heavy, all-welded steel case provides a big, rugged mounting for every operating assembly, and how electric motors at point of action give fast, positive, accurate control. Also shown are features making for operator comfort, plus inter-changeable tools ranging from bulldozer to snow plow. Folder may be obtained by requesting Tournatractor Features Folder, Form 54-005-T, from Advertising Department, LeTourneau-Westinghouse Co., Peoria, Ill.

For more information circle 132 on  
Service Coupon Page 12 and mail now

**Two-Way Radio for Industry**

A 12-page booklet, "Two-Way Radio for Industry," available from Radio Corporation of America, Building 15-1, Camden 2, N. J., shows what two-way radio is, how it works, and what it does. The application in the various industries are illustrated and detailed. Of special interest to construction people is the section directed to the "Special Industrial" and the "Low-Power Industrial" services.

The pamphlet explains the means for procuring a two-way radio system, giving the various steps of planning, installing, operating and servicing.

For more information circle 133 on  
Service Coupon Page 12 and mail now

**Handling Pre-Cast Concrete**

A new field report, No. 52, on the profitable handling of pre-cast concrete for bridges with the use of the RT-150 and YT-40 lift trucks has been issued by Hyster Co., P. O. Box 4318, Portland 8,

Ore. Prepared in the field by Hyster engineers, the illustrated report is an actual case history of modern labor-saving handling and construction methods in conjunction with Hyster models.

For more information circle 134 on  
Service Coupon Page 12 and mail now

**Clamshell Buckets**

A new 2-color, 4-page bulletin, No. H-1954, issued by George Haiss Mfg. Co., Inc., subsidiary of Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N. Y., describes and illustrates the complete line of Haiss multisheave clamshell buckets. The bulletin shows the  $\frac{1}{4}$  cu. yd. and  $\frac{1}{2}$  cu. yd. trenching buckets in addition to the line of general purpose and hi-power digging buckets.

For more information circle 135 on  
Service Coupon Page 12 and mail now

**Tensioning Materials for  
Prestressed Concrete**

A new catalog on "Tensioning Materials for Prestressed Concrete," issued by John A. Roebling's Sons Corporation, 640 South Broad St., Trenton, N.J., subsidiary of Colorado Fuel and Iron Corporation, gives detailed information and charts on characteristic properties of Roebling wire and strand, and includes descriptions and photographs of various construction jobs in which prestressing has been used. Featured are uncoated prestressed concrete strand for pre-tensioned bonded design, anchor fittings for post-tensioned design, and post-tensioned design as applied to the Canas River Bridge in Cuba and a California garage which used four of the largest prestressed concrete girders ever fabricated. Tensioning applications are also described and illustrated by sectional drawings.

For more information circle 136 on  
Service Coupon Page 12 and mail now

**Calcium Chloride in Road Work**

A new booklet "The Calcium Chloride Road" is being offered by Solvay Process Division, Allied Chemical & Dye Corporation. Designed for the practical road man, this new booklet describes in non-technical language how gravel, crushed stone and other similar types of road can be converted and maintained as smooth, dust-free riding surfaces without increasing present budgets. Illustrated with many how-to-do-it photographs, the text of the new booklet covers such phases of the subject as: how to plan a calcium chloride road; how to convert roads lacking sufficient binder soil or aggregate; drainage, blading and shaping; application of calcium chloride; and seasonal maintenance. In addition, the booklet shows how the calcium chloride road fits into a program as the intermediate type of improvement between the dusty unimproved road and the more expensive paved surface. Copies of this new booklet may be obtained without charge from the Advertising & Sales Promotion Department, Solvay Process Division, Allied Chemical & Dye Corporation, 61 Broadway, New York 6, N.Y.

For more information circle 137 on  
Service Coupon Page 12 and mail now

## With the Manufacturers and Distributors

NEW DEPARTMENT HEAD FOR DOW CHEMICAL. Bernard P. Thomas has been named director of the Highway Construction and Materials Department of The Dow Chemical Company's Midland Division. The department was formerly known as Dowflake Technical Service. The former director, Herman H. Miller, died last October.

**WAIT!** Before you buy any concrete cutting blades

Watch for the Amazing New "CLYDE" Duo-Bond Blades . . . for ALL Machines . . . at Low-est Prices ever offered.

Sensationally acclaimed on the Ohio Turnpike and other major paving projects.

Write THE CLYDE COMPANY  
R5 Division  
P. O. Box 72 RACINE, WISCONSIN

. . . for more details circle 245, page 12

## Get 4 BIG ADVANTAGES

with Serviced

### White Pigmented Concrete Curing Compounds

1. Fast, positive coverage...no missed spots
2. Reflects heat—reduces concrete temperatures 15° F.
3. Saves material...no waste or overlap
4. Does not run on sloping surfaces—"stays put" after application

Serviced White Pigmented Curing Compound is widely used in areas where atmospheric temperatures exceed 80° F. because it produces a membrane capable of reflecting heat to reduce concrete temperatures as much as 15° F. Even application, using minimum material and application time. May be sprayed or brushed.

Write for complete details and circular on Serviced Concrete Curing Compounds.



**SERVICED PRODUCTS CORPORATION**  
6051 West 65th Street, Chicago, Illinois

. . . for more details circle 206, page 12

STULZ-SICKLES NAMES DISTRICT SALES MANAGER. Stulz-Sickles Co., Camden, N. J., has appointed E. F. Hannum district sales manager in charge of Ontario operations, for all Manganal welding products including the two new ones that have just been released — Flo-Kote AC-DC welding electrodes and "Wing-Ding" individual slip-over tooth re-pointers. His headquarters will be in Cleveland, O.

NEW DISTRICT MANAGER FOR VICKERS, Inc. Arthur H. Van Wormer has been appointed district sales manager in Cleveland, O., for Vickers, Incorporated, Detroit, Mich. He succeeds Paul Simonds who retired after 13 years of service.

SNOWDEN PROMOTED BY DODGE. Byron S. Snowden, heretofore merchandising manager-trucks, has been appointed director of advertising and merchandising trucks for the Dodge Division of Chrysler Corporation, Detroit, Mich.

FELDMANN NOW EXECUTIVE VICE PRESIDENT. Walther H. Feldmann, vice president in charge of sales of Worthington Corporation for the past four years, became executive vice president of the corporation effective Jan. 1. He succeeds Edwin J. Schwanhauser whose election as president of Worthington was announced earlier. Thomas J. Kehane, assistant vice president and general sales manager, succeeds Mr. Feldmann as vice president in charge of sales.

RICHARDSON JOINS LUPTON AGENCY. G. Bruce Richardson, formerly an advertising accounts supervisor with Ingersoll-Rand Co., has joined John Mather Lupton Co., Inc., New York advertising agency as assistant account executive.

MARION-OSGOOD-GENERAL SALES MANAGER NAMED. Kenneth C. Williamson, formerly sales manager Osgood Co. has been appointed sales manager of Marion-Osgood-General Co. He will concentrate his activities on the sale of Marion-Osgood-General machines in sizes of 4 cu. yd. and under, through distributor organizations throughout the United States and Canada.

DIAMOND APPOINTS DISTRICT SALES MANAGERS. Diamond Iron Works, Division of Goodman Manufacturing Co., Chicago, Ill., has appointed A. C. Quinn and N. R. Bogie district sales managers in the southeast and south.

HEIL APPOINTMENTS. Harlan Stoller, former export and government sales manager of The Heil Co., Milwaukee, Wis., is now director of the new government, export and road machinery sales department of the company. Paul Miller, sales manager of the former Road Machinery Division, has been appointed sales manager of the new department.

LEROI NAMES PREMAR FIELD SALES MANAGER. Don S. Premar, formerly sales manager of stationary air compressors, has been appointed to the newly created post of field sales manager for LeRoi division of Westinghouse Air Brake Co. He will have over-all responsibility in managing the LeRoi sales organization.



## THIS Versatile Coupling

while used primarily for air-operated tools in field and factory, is equally efficient for water, oil and spray service. Illustration shows hose end and female I.P.T. end connected.

**"AIR KING"**  
QUICK ACTING UNIVERSAL  
HOSE COUPLING

Heads are locked by pressing together and giving quarter-turn. These locking heads are identical for all sizes of hose or threaded ends, permitting the coupling of any two sizes of hose, or hose and pipe, within the "AIR KING" size range. Equipped with patented safety locking device. Bronze or rustproofed malleable iron, in sizes up to 1".



Two Hose Ends Connected

Male I.P.T. End

Stocked by Manufacturers and Distributors of Industrial Rubber Products

**DIXON**  
Valve & Coupling Co.

GENERAL OFFICES & FACTORY—PHILADELPHIA 22, PA.  
BRANCHES—CHICAGO • BIRMINGHAM • LOS ANGELES • HOUSTON  
DIXON VALVE & COUPLING CO. LTD., TORONTO Associate Companies:  
Buck Iron Company, Inc., Quakertown, Pa. • Precision Steel Company, Canton, N.Y.

. . . for more details circle 246, page 12

Ask the man behind the gun . . .

White gives you  
everything you want  
in an engineer's  
transit



Shown, model 7014 with "A" standard. "U" type also available. \$575.00\* complete with tripod case and field equipment.

WHY are more and more engineers and builders choosing White Engineers' Transits? Basically, the reason is simple: White transits are designed and built for the man in the field. They incorporate all the work-saving, accuracy-boosting features . . . the rugged construction . . . the simplified quality components that you want. In addition, you get coated optics, covered leveling screws and internal focusing Telescope. Wide frame tripod is optional.

YOUR CHOICE OF THREE RETICULES  
AS SHOWN BELOW —



Fig. I  
Cross hair  
arrangement for  
our standard  
levels



Fig. II  
Stadia hair  
arrangement for  
our standard  
transits.



Fig. III  
Special stadia  
hair arrangement,  
furnished  
upon request.

To get the details on the complete White line of instruments for Engineers, Surveyors and Builders, write for Bulletin 1053. DAVID WHITE COMPANY, 359 W. Court Street, Milwaukee 12, Wisconsin.



We offer  
the most expert  
REPAIR SERVICE  
on all makes,  
all types of  
instruments

\*Prices subject to  
change without notice.

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Statistics of the job: length—14,000 ft.; bottom—10 ft. to 22 ft.; slope— $1\frac{1}{2}$  to 1 with 8-ft. crown; average depth— $6\frac{1}{2}$  ft.; total excavation—60,000 cu. yd. of adobe and some free dirt. General Superintendent Charles A. Aldrich reports: "We've been using Caterpillar-built equipment for 15 years and are well satisfied with its operation and the service facilities and parts procurement of our dealer."

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Engine	Horsepower and Piston Displacement	Parts per Horsepower	Fuel Consumption—pounds per BHP per hour	Horsepower per Cubic Inch Displacement	
<b>Engine A</b>	110 at 2200 RPM 358 cu. in.	(Stripped Engine) 7.38	.54	.307	<b>CHRYSLER ADVANTAGES OVER ENGINE A</b> . . . delivers 18 more horsepower . . . weighs 96 pounds less with 24% less weight per horsepower . . . uses 7.5% less fuel at average operating speed . . . delivers 26% more horsepower per cubic inch displacement
<b>Chrysler Model Ind. 24A</b>	128 at 2200 RPM 331 cu. in.	(Stripped Engine) 5.58	.50	.387	
<b>Engine B</b>	104 at 2400 RPM* 330 cu. in.	(Stripped Engine) 6.92	(Information not available)	.315	<b>CHRYSLER ADVANTAGES OVER ENGINE B</b> . . . delivers 34 more horsepower . . . weighs 5 pounds less with 25% less weight per horsepower . . . delivers 32% more horsepower per cubic inch displacement
<b>Chrysler Model Ind. 24A</b>	138 at 2400 RPM 331 cu. in.	(Stripped Engine) 5.18	.50	.416	
<b>Engine C</b>	99 at 2200 RPM 320 cu. in.	(Stripped Engine) 7.64	.56	.309	<b>CHRYSLER ADVANTAGES OVER ENGINE C</b> . . . delivers 29 more horsepower . . . weighs 60 pounds less with 27% less weight per horsepower . . . uses 10.5% less fuel at average operating speed . . . delivers 25% more horsepower per cubic inch displacement
<b>Chrysler Model Ind. 24A</b>	128 at 2200 RPM 331 cu. in.	(Stripped Engine) 5.58	.50	.387	
<b>Engine D</b>	117 at 2200 RPM 317 cu. in.	6.5**	.50	.369	<b>CHRYSLER ADVANTAGES OVER ENGINE D</b> . . . delivers 11 more horsepower . . . weighs 19 pounds more but with 6% less weight per horsepower . . . delivers 5% more horsepower per cubic inch displacement
<b>Chrysler Model Ind. 24A</b>	128 at 2200 RPM 331 cu. in.	6.1**	.50	.387	
<b>Engine E</b>	97 at 2200 RPM 372 cu. in.	(Complete Engine) 12.85	.58	.260	<b>CHRYSLER ADVANTAGES OVER ENGINE E</b> . . . delivers 31 more horsepower . . . weighs 395 pounds less with 48.7% less weight per horsepower . . . uses 14% less fuel at average operating speed . . . delivers 49% more horsepower per cubic inch displacement
<b>Chrysler Model Ind. 24A</b>	128 at 2200 RPM 331 cu. in.	(Complete Engine) 6.6	.50	.387	

\*Information not available at 2200 RPM \*\*Complete engine less flywheel housing

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